



3 1761 11972217 1

89-501

GOVT

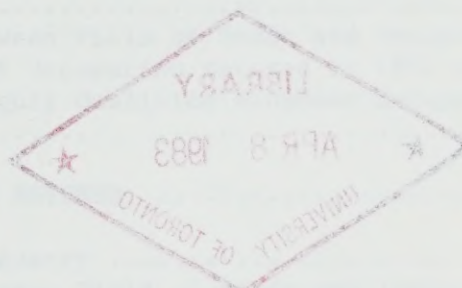
①

Statistics Canada
Research and Analysis Division
Social Statistics Field

University Graduates and Jobs: Changes during the 1970s

A Comparison of the Occupations and
Industrial Sectors Entered by University
Graduates in 1971 and 1978

by W.G. Picot



Published under the authority of the
Minister of Supply and Services Canada

The views expressed by the author are his own and not
necessarily those of Statistics Canada

© Minister of Supply
and Services Canada, 1983

March 1983
8-7000-503

Price: Canada, \$8.45
Other Countries, \$10.15

Catalogue 89-501E

ISBN 0-660-11231-0

Ottawa

Version française de cette publication
disponible sur demande (n° 89-501F)

Staff and
Research and
Social Sciences

University Graduates and Jobs: Changes during the 1970s

A Comparison of the Occupations and
Industrial Sectors Entered by University
Graduates in 1967 and 1978

by W.G. Picot



Publication of the University of Toronto
Library of Social and Behavioural Sciences

The volume number and the series number are
indicated by the following numbers:

1. Number of Volume
and Number of Series

March 1983
1983/1

Price: \$20.00
ISBN: 0-8020-2111-1

Copyright © 1983


ISBN 0-8020-2111-1

Order

Orders may be placed with the publisher
or with the bookseller nearest you.

CONTENTS

	Page
List of Charts	v
List of Tables	vii
Acknowledgments	xi
SUMMARY	xiii
INTRODUCTION	1
Scope and Aim of this Report	1
Recent Research on Education and Employment	3
Notes on the Data Base	8
I OCCUPATIONS OF GRADUATES	13
1. Occupational Distribution of Graduates	14
2. Men and Women	19
3. Relationship between Field of Study and Occupation	21
4. Change in Type of Occupation Entered in 1971 and 1978	29
5. Graduates and Highly Qualified Manpower Occupations	34
Summary	39
II INDUSTRIES GRADUATES ENTERED	41
1. Employment by Industry	42
2. Relationship between Field of Study and Industry	51
3. The Public and Commercial Sectors	57
4. Comparison with American Graduates	60
5. Field of Study and the Public and Commercial Sectors	63
6. The Utilization of Graduates in the Public and Commercial Sectors	70
III PUBLIC SECTOR JOBS AND CHANGING GRADUATION PATTERNS	79
1. The Decline in Public Sector Growth	79
2. Effect on Graduation Patterns	83
CLOSING COMMENTS	93
APPENDIXES	
A - The Interprovincial Movement of University Graduates	95
B - The Occupational and Industrial Distributions for Three Different Subpopulations of Bachelor's Graduates	102
C - A Rank-Ordering of Major Occupations and Industries of Employment for Men and Women	111
D - List of Codes used in this Report	121
E - Index of Concentration	129
F - Additional Tables on Degrees Granted	131
Bibliography	135



Digitized by the Internet Archive
in 2024 with funding from
University of Toronto

<https://archive.org/details/31761119722171>

List of Charts

	Page
1. Employment by Occupation of Bachelor's Graduates Two Years after Graduation, 1971 and 1978	15
2. Employment by Occupation of Master's Graduates Two Years after Graduation, 1971 and 1978	17
3. Employment by Occupation of Doctoral Graduates Two Years after Graduation, 1971 and 1978	17
4. Proportion of Bachelor's Graduates in the Principal Occupation Two Years after Graduation, by Field of Study, 1971 and 1978	22
5. Employment of Bachelor's Graduates Two Years after Graduation, by Field of Study and by Occupation, 1971 and 1978	30
6. Bachelor's Graduates in Non-HQM Occupations Two Years after Graduation, by Field of Study, 1971 and 1978	35
7. Employment by Industry of Bachelor's Graduates Two Years after Graduation, 1971 and 1978	43
8. Number of Bachelor's Graduates Entering an Industry per 10,000 Employees, 1978 and 1978	44
9. Employment by Industry of Master's and Doctoral Graduates Two Years after Graduation, 1971 and 1978	46
10. Employment of Bachelor's Graduates Two Years after Graduation, by Field of Study and by Industry, 1971 and 1978	52
11. Employment of University Graduates in the Public and Commercial Sectors Two Years after Graduation, 1971 and 1978	58
12. Bachelor's Graduates Employed in the Public and Commercial Sectors, Canada and the U.S., 1978	61
13. Bachelor's Graduates Entering Selected Industries, Canada and the U.S., 1978	61
14. Percent of Bachelor's Graduates Employed in the Public Sector Two Years after Graduation, by Field of Study, 1971 and 1978	64
15. Percent of Master's Graduates Employed in the Public Sector Two Years after Graduation, by Field of Study, 1971 and 1978	68
16. Percent of Doctoral Graduates Employed in the Public Sector Two Years after Graduation, by Field of Study, 1971 and 1978	68

	Page
17. Average Annual Increase in Real Domestic Product by Industry, Canada, Selected Years	80
18. Index of Growth in Bachelor's Degrees Granted in Canada, 1970 to 1981	84
19. Index of Growth in Master's Degrees Granted in Canada, 1970 to 1981	88
20. Index of Growth in Doctoral Degrees Granted in Canada, 1970 to 1981	89
21. Interprovincial Movement of Graduates: Percentage Gain or Loss of Graduates through Interprovincial Movement during the Two Years following Graduation, by Province, 1969 to 1971 and 1976 to 1978	97

List of Tables

	Page
1. Employment by Occupation of Bachelor's, Master's, and Doctoral Graduates Two Years after Graduation, by Sex, 1971 and 1978	20
2. Principal Occupation and Index of Occupational Concentration for Bachelor's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978	24
3. Employment by Occupation of Master's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978	27
4. Employment by Occupation of Doctoral Graduates Two Years after Graduation, by Field of Study, 1971 and 1978	28
5. Employment by Occupation of Bachelor's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978	32
6. Bachelor's Graduates in HQM Occupations, Rank-Ordered by Detailed Field of Study, 1971 and 1978	36
7. Graduates in Non-Highly Qualified Manpower Occupations Two Years after Graduation, by Degree Type and Field of Study, 1971 and 1978	37
8. Employment by Industry of Bachelor's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978	47
9. Employment by Industry of Master's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978	48
10. Employment by Industry of Doctoral Graduates Two Years after Graduation, by Field of Study, 1971 and 1978	49
11. Master's and Doctoral Graduates Hired per 100,000 Employees Two Years after Graduation, by Industry, 1971 and 1978	50
12. Principal Industry of Employment and Index of Industrial Concentration for Bachelor's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978	54
13. Bachelor's Graduates Employed in the Public Sector Two Years after Graduation, by Detailed Field of Study, 1971 and 1978	66
14. Bachelor's Graduates Employed in the Public Sector Two Years after Graduation, by Major Field of Study and by Sex, 1971 and 1978	67
15. Graduates Employed in the Public Sector Two Years after Graduation, by Degree Type and Major Field, 1971 and 1978	69

	Page
16. Participation and Utilization of 1976 Bachelor's Graduates in the Public and Commercial Sectors in 1978	71
17. Participation and Utilization of 1969 Bachelor's Graduates in the Public and Commercial Sectors in 1971	72
18. Median Salary of 1968 and 1976 Bachelor's Graduates by Field of Study and by Industrial Sector, 1970 and 1978	74
19. Participation and Utilization of 1977 U.S. Bachelor's Graduates in the Public and Commercial Sectors, 1978	75
20. Change in Degrees Granted between 1976 and 1981 in Canada, by Field of Study	86
21. Distribution by Field of Study of Bachelor's Degrees Granted in Canada, 1970, 1976, and 1981	87
22. Distribution by Field of Study of Master's and Doctoral Degrees Granted in Canada, 1970, 1976, and 1981	90
A1. Interprovincial Movement of 1969 and 1976 University Graduates: Province of Graduation and of Residence Two Years Later, 1969 and 1976	98
A2. Net Gain or Loss of Graduates from Interprovincial Movement during the Two Years Following Graduation, All Degree Levels	99
A3. Net Gain or Loss of Graduates from Interprovincial Movement during the Two Years following Graduation, Bachelor's Graduates ..	100
A4. Net Gain or Loss of Graduates from Interprovincial Movement during the Two Years following Graduation, Master's and Doctoral Graduates	101
B1. Employment by Occupation for Three Subpopulations of Bachelor's Graduates Two Years after Graduation, by Field of Study, 1978 ..	106-7
B2. Employment by Industry for Three Subpopulations of Bachelor's Graduates Two Years after Graduation, by Field of Study, 1978 ..	108-9
C1. A Rank-Ordering of Major Occupations of Bachelor's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978 ...	112-13
C2. A Rank-Ordering of Major Occupations of Bachelor's Graduates Two Years after Graduation, by Field of Study and by Sex, 1971 and 1978	114-15
C3. A Rank-Ordering of Major Industries of Employment for Bachelor's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978	116-17

	Page
C4. A Rank-Ordering of Major Industries of Employment for Bachelor's Graduates Two Years after Graduation, by Field of Study and by Sex, 1971 and 1978	118-19
F1. Number of Bachelor's and First Professional Degrees Granted in Canada by Field of Study, 1970 to 1981	132
F2. Number of Master's Degrees Granted in Canada by Field of Study, 1970 to 1981	133
F3. Numbers of Doctoral Degrees Granted in Canada by Field of Study, 1970 to 1981	134

Acknowledgements

The author is very grateful to John Turner of the Research and Analysis Division in Statistics Canada for his valuable assistance, both in conducting parts of the analysis and providing computer programming support. The author would also like to thank those who took the time to review and comment on the work, in particular Laura Selleck of the Council of Ontario Universities, R. Patterson and R. Knowles of the Ministry of State for Science and Technology, and Amy Kempster of Statistics Canada. Marie Saumure and Lynda Auger provided skillful secretarial work during the project and the technical support of Marie-Claire Couture was very helpful. The author would like to thank them for their assistance.

SUMMARY

This is a study of three aspects of the relationship between university graduates and employment:

1. the occupations of graduates early in their career
2. the industries graduates enter
3. the decline in public sector employment opportunities and the effect on graduation patterns.

Although the data in this study are from the 1970s, they are from two periods seven years apart. They cover the employment status of 1969 graduates in 1971, and 1976 graduates in 1978. Along with the data indicating the employment status is included data on graduation patterns from 1970 to 1981. If a phenomenon was evident in both 1971 and 1978, it may be part of a long-term trend, and persist today.

This study hopes to contribute to a better understanding of the integration of university students into the labour force, and also to suggest the kind of information that could be made available if data such as these were obtained on a regular basis.

Introduction

The 1960s saw a rapid expansion in postsecondary education. This growth was based largely on two theories: 1) the theory of human capital, the idea that education is an economic investment, for both individuals and society, and 2) the theory of universal access which advocates the general availability of postsecondary education.

By the 1970s, however, the economic value to individuals of some kinds of university education to individuals was coming into question. Various studies revealed a rapid increase in the supply of graduates without a commensurate increase in demand, which resulted in a deterioration of their occupational status in comparison with graduates of earlier periods. Nevertheless, university graduates were less likely to be unemployed than their contemporaries with less education. More recent findings have suggested that the job market for graduates may improve in the 1980s because the number of persons graduating is expected to decline by the second half of the decade. In fact, shortages in some occupations requiring a degree, such as engineering, computer science, and even teaching in the western provinces, have been forecast. These studies, however, did not anticipate the current economic recession, so the value of their conclusions is questionable as long as the demand for labour of all types continues to be very depressed.

Most studies examining the labour market experiences of graduates have ignored differences among fields of study, usually because the data were not available. A major strength of this work is that the industry and occupations of graduates from particular disciplines are described.

The data are from 1971 and 1978 employed university graduates two years after they received their degrees. The first sample consists of approximately 6,400 1969 graduates employed full-time or part-time in June 1971; the second consists of 15,000 1976 graduates employed full-time or part-time in June 1978.¹

¹ It was not possible to select only those employed full-time in both surveys so both full-time and part-time employed graduates were used in this study. According to the 1978 survey, however, the part time component was not large (5.6 per cent).

1. Occupations² of Graduates

Teaching was by far the most important source of employment for university graduates in the 1970s. In 1971, 42 per cent of all employed 1969 bachelor's graduates were teaching. With the overall decline in school enrolment during the 1970s, teaching opportunities decreased, and by 1978 the proportion of bachelor's graduates in teaching had fallen slightly to 37 per cent. At the master's level, the corresponding proportions were 31 per cent and 25 per cent, and at the doctoral level, 54 per cent and 43 per cent.

Despite the decline in school enrolment, about the same proportion of education graduates found teaching jobs in both the early and late 1970s, earning salaries at or above average for all graduates. This may in part have been due to the introduction of the ruling in the early 1970s in some provinces that elementary school teachers have a university degree, which in essence expanded the labour market for university graduates. The proportion of bachelor's graduates becoming elementary teachers actually rose over the period surveyed (13 per cent to 18 per cent).

Since the requirement of a degree at the secondary level had existed for many years, there was no effect from academic upgrading on the employment patterns at that level. The proportion of graduates becoming secondary teachers fell considerably--from 25 per cent to 12 per cent. Overall, however, education graduates appeared to do better than average in the labour market, at least until the mid to late 1970s, both in terms of salary and the ability to locate employment related to the education. It is not known if this situation continues today, but the circumstances that made it possible in the 1970s--i.e. academic upgrading--have largely passed.

Throughout the 1970s, there continued to be a major difference in the types of occupations entered by male and female graduates. Women tended to accept positions in teaching, clerical work, the social sciences, and health, while

² An occupation is a collection of jobs in which people do the same or a similar kind of work (such as engineering, teaching, architecture).

men were apt to be in engineering, math, science, and management or management support occupations, as well as in teaching.

Some fields of study were strongly related to particular occupations; graduates of others entered a wide range of jobs. At the bachelor's level, graduates of professional fields, education, and engineering tended to work in directly related occupations. Graduates of the social and biological sciences displayed the weakest ties to specific occupations and were dispersed among many different types of jobs. Humanities graduates tended to be teachers.

The proportion of bachelor's graduates entering jobs not requiring a postsecondary education two years after graduation rose (21 per cent to 26 per cent). At the master's level, the proportion remained constant at 15 per cent, and at the doctoral level, it rose from 9 to 12 per cent.

There was, however, a wide variation by field of study. The labour market appeared to weaken most during the 1970s for biological science graduates, as the proportion of these graduates in jobs not requiring postsecondary education rose from 27 to 46 per cent at the bachelor's level, from 9 to 30 per cent at the master's level, and from 16 to 25 per cent at the doctoral level.

2. Industries³ Graduates Entered

The education industry was the principal employer of graduates: in 1978, 41 per cent of bachelor's graduates were in education, 44 per cent of master's, and 57 per cent of doctoral graduates. The ability of the education industry to absorb new graduates, however, declined over the period, particularly at the doctoral level.

³ An industry is a collection of business establishments or public organizations engaged in a similar kind of economic activity, such as mining, manufacturing, education.

After education, public administration and health and welfare were most important. Other significant employers included services to business management (such as computer, engineering, accounting, advertising and scientific services) and manufacturing.

Industries were classified as **public** (non-commercial) and **commercial**: education, public administration, health and welfare services being public; all other industries being commercial. The latter includes what is commonly referred to as the private sector, plus public enterprises of a commercial nature, such as crown corporations.

The majority of 1976 graduates were employed in the public sector in 1978 (bachelor's--60 per cent; master's--70 per cent; doctoral--80 per cent) while only one-quarter of the labour force as a whole was employed in that sector.

Even though the majority of graduates found jobs in the public sector, the proportion working there declined over the period between 1971 and 1978 at all three levels, probably in response to declining job opportunities in the public sector. As will be seen later, it is likely this proportion continued to fall, although to what extent is not known.

A comparison with the United States using the same definitions (of the public and commercial sectors) revealed that, in contrast to the Canadian evidence, a majority of American bachelor's graduates found jobs in the commercial sector in 1978. Here too there were variations by field of study. A surprising 71 per cent of American humanities graduates found jobs in the commercial sector in 1978, compared to only one-third of Canadian humanities graduates.

For Canada, the major fields of study were classified according to the likelihood of graduates finding jobs in one of the two sectors. In the mid 1970s, three-quarters of bachelor's graduates had majored in a field that placed the majority of its graduates in the public sector (what will be called public-sector oriented fields, including education, humanities, biological sciences, social sciences), and almost three-quarters of these people were working in the public sector. About one-quarter of bachelor's

graduates had majored in a commercial-sector oriented field (engineering, business/commerce, math/physical sciences, law, economics) and three-quarters of them were employed in the commercial sector.

Women were more likely to study in public-sector oriented fields than men. Thus, overall three-quarters of female 1976 bachelor's graduates were employed in the public sector as compared to approximately one-half of male graduates.

Bachelor's graduates of the public-sector oriented fields who were employed in the public sector found relatively high-paying jobs that required post-secondary education. However, the one-quarter of bachelor's graduates of the same fields who were working in the commercial sector obtained relatively low-paying jobs that in the majority of cases did not require postsecondary education.

Bachelor's graduates of commercial-sector oriented fields, on the other hand, were likely to obtain jobs with relatively high salaries that required a degree whether they worked in the commercial or in the public sector. These patterns were observed both in 1971 and 1978.

At the master's level, only graduates in business and engineering were more likely to find commercial sector than public sector jobs in 1978. And for doctoral graduates, only engineering placed a significant proportion of graduates (50 per cent) in the commercial sector. All other fields placed the vast majority (from 80 to 95 per cent) of their graduates in public sector jobs.

3. Public Sector Jobs and Changing Graduation Patterns

Since such a large proportion of graduates depended upon the public sector for employment during the 1970s, it is important to understand how job opportunities in that sector changed during the decade.

Growth in the education and public administration industries, as reflected both in the real domestic product (goods and services produced by an

industry) and employment data, was relatively high early in the decade but declined throughout the 1970s. For example, in the education sector the number of teachers was increasing at an annual average rate of 3.4 per cent between 1969 and 1971. By 1976 to 1978, numbers were falling on average -0.3 per cent annually, and the decline continued through the rest of the decade. The pattern in the government sector, the next largest employer of graduates, was much the same. Employment growth was an annual average of 4.5 per cent during 1969 to 1971, 2.0 per cent during 1976 to 1978, and virtually zero between 1978 and 1980. This decline almost certainly affected employment opportunities for graduates, causing a shift toward employment in the more rapidly growing commercial sector.

The increasing supply of graduates relative to demand, and in particular the decline in job opportunities on the education and government sector, prompted many, such as the Task Force for Labour Market Developments in the 1980s, to call for a reallocation of resources in the postsecondary system. They advocate an expansion in engineering, technological training, and selected business programs, and a reduction in general arts and disciplines related to education and public administration. They further suggest that some funds be reallocated from the postsecondary system to training in the technologies and skilled trades.

Others, however, strongly believe that the commercial sector should accept more responsibility for training graduates and providing specific skills, particularly for graduates from what have been called here the public-sector oriented fields. This would increase both the hiring and utilization of these graduates in the commercial sector, which was shown here to be very low, at least early in their career. It is argued by many that the education received in many of these fields is intended to develop students' full intellectual potential, and to allow them to adapt to new roles and circumstances. It is further argued that while these may not be the qualities immediately sought by employers, they will serve the individual well through a lifetime of work and experience, thus also serving the employers' interest.

Data on degrees granted suggest there has been a considerable response in the direction recommended by the Employment and Immigration Task Force and others to the 1970s labour market experiences of graduates described here.

At the bachelor's level, the response was two-fold. First, there was a decline in the number of university graduates in the late 1970s and early 1980s. (This, however, is likely to be short-lived, since university enrolments have been increasing rapidly in recent years, and the number of graduates will start rising again soon.) Second, there was a movement away from the public-sector oriented fields of study. Between 1976 and 1981, the number of graduates in the commercial-sector oriented fields rose 39 per cent. Every field within the group registered an increase, ranging from 54 per cent in business and commerce to 10 per cent in mathematics and the physical sciences. The number of graduates in the public-sector oriented fields fell by -9 per cent with every field in the group registering a decline.

At the master's and doctoral level, the reaction of students as reflected by degrees granted statistics was less evident. There has, however, been an overall decrease in the number of graduates. The number of master's graduates rose 47 per cent between 1970 and 1977 and has changed little since then (to 1981). At the doctoral level, the number of degrees granted peaked in 1973, and has been, in general, slowly declining since then. It was 7 per cent lower in 1981 than in 1973.

Because of the changing mix of bachelors graduates just described, it is likely that the proportion of graduates locating commercial sector employment continued to rise since 1978, at least until the current recession which started in August of 1981. But the degree to which this occurred is not known. Whether there has also been a reaction in the commercial sector to accept more responsibility for training graduates in general disciplines is not known either. Whether there has been a change in the relationship between particular fields of study and occupation and industry of employment is another question. Current data at the national level on the labour market experience of university graduates, which would be required to answer these and other questions, are not available.⁴

⁴ A survey of doctoral graduates, however, was conducted by Statistics Canada in 1981. Data are available from the Education, Science and Culture Division.

INTRODUCTION

Scope and Aim of this Report

This study examines three aspects of the relationship between education and employment. The first section provides descriptive statistics on the occupations university graduates entered early in their careers and the changes that occurred between 1971 and 1978. Perhaps the more interesting story of changing employment patterns for graduates in the 1970s, however, is found in sections II and III. The second section describes the industries that hire graduates. The third section considers graduates in terms of their traditional dependency on the public sector for employment, and of the effect on graduation patterns from 1970 to 1981 of the slowdown in public sector growth.

The principal aim of this report is to contribute to an understanding of the integration of university graduates into the labour force that will be helpful to educators, students, employers, and analysts. Despite the seven billion dollars spent annually on postsecondary education, not to mention the time and effort invested by the students themselves, relatively little "hard" information has been collected at the national level on how graduates are utilized in the economy. It is also hoped that this study will show the need for the systematic collection of data to monitor the labour market experiences of graduates.

Two points were made by David Slater, Chairman of the Economic Council, in his forward to an earlier Statistics Canada publication.⁵ The first was that "despite widespread agreement regarding its importance, the state of knowledge in this country in the linkages between education and employment is still rather premature". The second point was made in reference to the fact that the 1978 survey by Statistics Canada (on which this study was partially based) was the first of its kind to provide such detail and to cover most provinces in Canada. Slater stated that the results of that

⁵ Job Market Reality for Postsecondary Graduates, Catalogue No. 81-572, (Ottawa: Statistics Canada, 1981).

survey "need to be interpreted with some care. There are limitations associated with a solitary 'one-shot' effort and these cannot be ignored. Due to changing circumstances, a similar enquiry carried out at another time might well reveal significantly different patterns."

This study was initiated in part to address these two points. Fortunately, a previous survey, the 1973 Highly Qualified Manpower survey, provided an opportunity to obtain data on the employment experiences of graduates from an earlier period so that a comparison over time could be made. (More information on these two surveys is given in the Notes on the Data Base.) Although the data are from the 1970s, the fact that they are from two periods seven years apart lends them an historical perspective. If a phenomenon was discovered in both of these periods, there is reason to believe it formed part of a trend that may continue in the 1980s.

Clearly, education has many social objectives, only one of which is to provide trained manpower for the economy. The overall purpose of education will not be discussed here, since it is beyond the scope of this report.

Recent Research on Education and Employment

The growth of postsecondary education [in the 1960s] was more than just a response to the "baby boom". It was based on a belief that our shrewdest and most profitable investment rested on the education of our people. It was thought that a general increase in education would contribute to economic growth. This view was grounded in the theory of human capital as a means of attaining economic prosperity. As such, the expansion of postsecondary education was an investment in a strategy aimed at increasing the skills and knowledge of the population.

- T.P. Adams, Assistant Deputy
Minister of Colleges and
Universities in Ontario, 1980

This passage from a 1980 paper by T.P. Adams offers a valuable summary of the reasons for the rapid growth of postsecondary education in the 1960. The "theory of human capital", which was strongly supported in the 1960s, expresses the idea that a person's level of earnings depends on the investment that person has made in acquiring skills valued in the labour market. It holds that people seek further education not for its own sake (which would reduce education to a consumer good) but rather in anticipation of future economic and non-economic gains (that is, as an investment).

Another theory which encouraged growth in postsecondary education in the 1960s was the "theory of universal access". Inspired by the egalitarian spirit of democracy, this theory advocated the general availability of postsecondary education.

Postsecondary education was strongly encouraged in the 1960s by the relationship that was established between education and employment by the theory of human capital, but by the 1970s questions were beginning to arise about the value of the "return" on the education investment. A number of studies were suggesting that graduates were taking jobs of considerably lower status than those of their counterparts in the 1950s and 1960s.

Probably the most influential study was by an American economist, R.B. Freeman (1976), who observed an unprecedented downturn in the job market for

college graduates in the United States in the 1970s. He found that their real and relative (to other workers) earnings were declining, and that their employment opportunities were deteriorating. He also noted that in response to the depressed market, the proportion of young men enrolling in college in the U.S. had dropped.

In a more recent work, Freeman (1982) found that the economic value of higher education declined in the 1970s, not only in the United States, but in other major industrialized countries as well, including Canada, Australia, the United Kingdom, Japan, France, Italy, Denmark, and Germany. He discovered that in almost all these countries the income of graduates relative to all other workers decreased during the 1970s. He also found that the unemployment position of graduates deteriorated in an absolute sense, in some cases even relative to other workers. These effects were most severe in the early part of the decade. He offered the hypothesis (as did Zsigmond et al (1978) for the Canadian situation), that these effects were largely the result of an increase in the supply of graduates during the 1970s. The substitution between more and less educated workers and the elasticity of the supply of graduates were such that shifts in the supply of and the demand for graduates could have a sizable effect on wages.

In Canada, E.B. Harvey, in a report for the Commission on Post-Secondary Education in Ontario (1971), found that even by the late 1960s graduates with bachelor's degrees in arts and science were receiving less prestigious jobs than they would have in the early 1960s. While elementary and secondary teaching had been the major source of employment for such graduates, the demand for teachers was beginning to decline, and other fields with commensurate occupational prestige were not opening up quickly enough to accommodate the graduates.

Another Canadian study by Zsigmond et al (1978) reviewed the demographic factors that led to the increasing supply of university graduates throughout the 1960s and 1970s, and emphasized the decreasing demand for those graduates in teaching, and also in government. A number of others wrote on the subject in Canada including Beach (1978) and Picot (1979).

In light of the general decline during the 1970s in the return on the investments made in education, several particular questions bear further examination. How, for example, were graduates utilized in the economy? What industries employed a large number of graduates and had a highly educated work force? Did university enrolment patterns change in response to labour market conditions of the 1970s?

Most of the previous studies on the relationship between education and employment did not consider the differences in fields of study of graduates, largely because the data were not available. In those studies that did, a definite dichotomy was observed in the labour market experience of graduates in different fields. Those with engineering, business, and computer science degrees, for example, were generally not as adversely affected by the decline of the 1970s as those with degrees in the social and biological sciences and humanities. Nevertheless, inspite of this decline, it is significant that those with university degrees continued to have superior employment opportunities to those without degrees (see McRoberts, 1980).

Prior to the onset of the current economic recession, analysts were suggesting that, with the passing of the baby boom, the actual number of young people would begin to decrease and that therefore the labour market would improve for them in the 1980s. Freeman (1978), in an overview of the work force of the future, forecast that the coming decline in the number of young people would enhance labour market opportunities for them. He suggested that the demand for postsecondary graduates relative to supply would be more balanced in the future than it was in the 1970s, enticing a larger proportion of young people to college or university. Zsigmond et al (1978) also noted the implications of this projected decline in the number of young people and of graduates.

A study by Metz and Crane (1980) suggested a teacher shortage may be developing in the United States because of a decline of young people entering that profession that began in 1973. They noted that in response to labour market conditions, the number of new graduates qualified to teach fell 23 per cent between 1975 and 1977. The result was a more propitious climate for graduates entering teaching in 1978--they fared better than

bachelor's degree graduates as a whole. The study noted, however, that a turnaround in supply would lead to a continuing surplus over the decade.

In Canada a study from the office of Analytical Studies at Simon Fraser University (1980) concluded that although the number of highly skilled people entering the labour market would drop by the mid-to-late 1980s, an overall shortage of highly qualified manpower was not anticipated, since the short-term effect of reduced supply could be mitigated by drawing from the oversupply of previous years and by change in the mix of fields of study.

The Simon Fraser study also discussed possible regional imbalances in specific occupations in the 1980s and suggested there might be shortages in engineering and the health fields in the West, particularly among doctoral and master's graduates in biology and life sciences. A study conducted by the B.C. Research Council, pointing to high migration to British Columbia as a source of increasing school enrolment, has suggested there might be a teacher shortage in B.C. in the future. The Simon Fraser study, however, viewed this suggestion with some caution, noting that there might be many teachers employed in other occupations who would be ready to re-enter teaching.

In their 1982 study, In Short Supply: Jobs and Skills in the 1980s, the Economic Council of Canada concluded that there were currently critical shortages in the scientific and engineering fields. They noted that specific problem areas were "those involving all types of engineers, computer programmers and analysts, and engineering technicians and technologists." Noting that imbalances already existed, the study warned that these imbalances could well become even more critical in the 1980s and 1990s. A 1980 study by the Department of Employment and Immigration also indicated a possible shortage of engineers in Canada between 1980 and 1985.

The current economic recession has decreased the demand for highly qualified labour, probably discouraged westward migration, and encouraged attendance at universities and colleges in Canada.⁶ These factors would most

⁶ Enrolments in the early 1980s are much higher than earlier expected and it is generally believed that this is related to lack of employment opportunities. Both university and college full-time enrolment increased 5 per cent in 1981-82, and preliminary data suggest the increases will be 6.5 per cent for university and 8 per cent for college enrolment in 1982-83.

certainly have influenced the outlook for graduates developed in all but the most recent reports just mentioned had they been known. It seems likely, however, that the availability and mix of the manpower supply, and the direction taken by young people toward employment will continue to be of great concern. Attention will continue to be focused on the education system because it is the skills developed at all levels of that system that subsequently move into the labour market.

In the United States, the National Centre for Education Statistics conducted a number of surveys during the 1970s to determine the employment status of recent graduates, and it continues to survey graduates on a cycle of approximately three years. In Britain, the type of employment obtained by university graduates is monitored annually through the University Grants Committee's "first destinations" statistics.

Although interest has been expressed in Canada, no regular procedure of monitoring has yet been established in this country.

Certain schools, colleges in particular, conduct follow-up surveys for their own use. These rarely, however, contain the data necessary for the kind of analysis presented here. They are designed to meet the specific needs of the institution and usually do not capture the occupation and industry in sufficient detail for analyses such as this. Some provinces have conducted follow-up surveys of college graduates--notably Manitoba, Québec, Saskatchewan, and recently Newfoundland--but have excluded university graduates from these programs. More recently, the Maritime provinces and B.C. have indicated the intention to monitor the employment experiences of graduates, but again primarily at the college and/or vocational school level. To the author's knowledge, little work at the university level is being contemplated.

Ontario periodically surveys both college and university graduates, and it was a joint project between Statistics Canada and Ontario to survey 1974 and 1975 graduates that led to the 1978 Statistics Canada college and university graduates survey that instigated this report.

Notes on the Data Base

This report uses data on the employment status of 1969 graduates in June 1971, and of 1976 graduates in June 1978.

Only university graduates are represented. Nation-wide data on community college graduates were not available for these two time periods. The data do not include information about employment changes in the careers of these graduates more than two years after graduation.

The analysis is of graduates who were employed full-time or part-time in 1971 or 1978. Graduates who were unemployed, continuing their education, or for other reasons not at work are excluded.⁷

The division between full-time and part-time employment could not be made on a comparable basis in both data sets, so all employed graduates were included. As of June 1978, 5.8 per cent of employed 1976 bachelor's graduates were working part-time as were 5.4 per cent of employed master's and doctoral graduates.

Although the employment status of graduates was measured two years after graduation, this does not necessarily mean two years of continuous experience in the labour market. Some graduates may have taken further education or training during the two-year period, or stayed out of the labour force for some other reason. Unfortunately, a subpopulation of graduates with two years' labour market experience following graduation could not be identified in both surveys. Thus, for the sake of comparability, all graduates were left in the sample. The only constraint imposed was that they be employed on the survey date. However, data for the 1978 survey suggest that approximately 40,000 of the 49,000 bachelor's graduates represented were in the labour force for most of the two-year period (i.e. 17 months or more). Furthermore, analysis indicates that the major findings regarding occupation

⁷ For complete details on the employment status of 1976 college and university graduates in 1978, see Job Market Reality for Postsecondary Graduates, Catalogue No. 81-572, (Ottawa: Statistics Canada, 1981).

and industry of employment are basically the same whether all employed graduates are included or only those with 17 months or more of labour force participation. (This issue is developed in more detail in Appendix B.)

The data on the 1969 graduates are a subset of the Highly Qualified Manpower Survey, conducted by Statistics Canada in 1973. This was a sample survey of all degree holders living in Canada at the time of the census of June 1971. Only persons who had a university degree from a Canadian university in 1969 and who were employed full-time or part-time in 1971 are included in the subset. In the survey, approximately 76 per cent of the persons selected provided valid responses to the questions of interest here, resulting in the following sample size:

Bachelor's and First professional ⁸	5,000 valid responses representing 38,000 graduates from Canadian universities
Master's	1,150 valid responses representing 4,800 graduates
Doctoral	184 valid responses representing 700 graduates

The data on the 1976 graduates was obtained from the Survey of 1976 College and University Graduates conducted by Statistics Canada in 1978. This was a sample survey of community college and university graduates in all provinces but Québec, which did not participate because it had its own graduate follow-up program. Approximately 71 per cent of the persons selected in the sample provided valid responses to the questions of interest here, resulting in the following sample size:

Bachelor's and First professional	11,650 valid responses representing 50,000 graduates
Master's	2,830 valid responses representing 6,000 graduates
Doctoral	510 valid responses representing 900 graduates

⁸ "First professional" are those programs that are not master's level, but require some university education for admission, i.e., medicine, law, theology, veterinary medicine, dentistry, and education programs requiring a degree for admission.

Because Québec did not participate in the latter survey, the two populations are not strictly comparable. The 1978 survey covered only nine provinces, while the 1971 data refer to all of Canada.

One method of ensuring comparability would have been to exclude Québec from the 1971 data. This choice was avoided because the 1971 sample size, even with Québec, was less than one-half that of 1978 and would have been too small to link field of study with occupations at a meaningful level of detail.

Statistical tests on the 1971 data indicated that the occupational and industrial distributions for graduates from particular fields were not significantly different for the nine provinces than for Québec. Therefore it is argued, first, that the data for both periods are indeed representative of the nine provinces (though not of Canada), and second, that any disparities between the 1971 and 1978 findings were due not to the inclusion of Québec in 1971 but to other factors.

The occupation and industry data in the two surveys can be compared directly, since the same coding system was used in both surveys for these two variables.⁹

Occupation and industry are defined as follows:

An **occupation** is a collection of jobs in which the people do the same or a similar kind of work, for example, engineer, economist, manager, musician, salesman, teacher, electrician.

An **industry** is a collection of business establishments or public organizations engaged in a similar kind of economic activity, for example, mining,

⁹ Statistics Canada's Occupational Coding Manual (OCM) was used to code occupations, and the Standard Industrial Classification Manual (SIC) to code industry. The OCM is based on and is very similar to the more widely known Canadian Classification and Dictionary of Occupations (CCDO). For a listing of codes used, see Appendix D.

manufacturing, trade, construction, personal services, education, public administration.

There is, of course, interaction in the economy between industries and occupations. A particular industry will employ persons in a wide range of occupations; a particular occupation may be found in various industries.

The field of study coding systems used in the two surveys were different, but a slight adjustment allowed the 1971 codes, which were more detailed, to be aggregated to categories used in the 1978 survey.

Section I OCCUPATIONS OF GRADUATES

For many students, employment in a particular occupation is their reason for pursuing postsecondary education. For others, especially those in general disciplines, this may not be the immediate or entire objective, but it is most likely one of the anticipated benefits of graduating.

This report cannot indicate to graduates the likelihood of their finding employment in a particular occupation if they select a particular field of study. Changing economic conditions make such predictions impossible when based only on historical data. The study can, however, provide some evidence of the stability of the relationship between field of study and occupation over time.

In this section five general questions are addressed.

1. What were the predominant occupations entered by bachelor's, master's and doctoral graduates, and did these change between 1971 and 1978?
2. Did men and women tend to enter different occupations?
3. What was the relationship between field of study and occupation, and were there changes during the 1970s?
4. Were there changes in the type of occupation entered by graduates between 1971 and 1978?
5. How many graduates were employed in jobs not requiring a postsecondary education, and did this change during the 1970s?

1. Occupational Distribution of Graduates

A. Bachelor's Graduates

Chart 1 shows the distribution by occupation of employed 1969 bachelor's graduates in 1971, and 1976 graduates in 1978. By far the greatest number of these graduates were engaged in teaching. In 1971, 42 per cent of all bachelor's graduates were teachers; by 1978 this percentage had fallen slightly to 37 per cent.

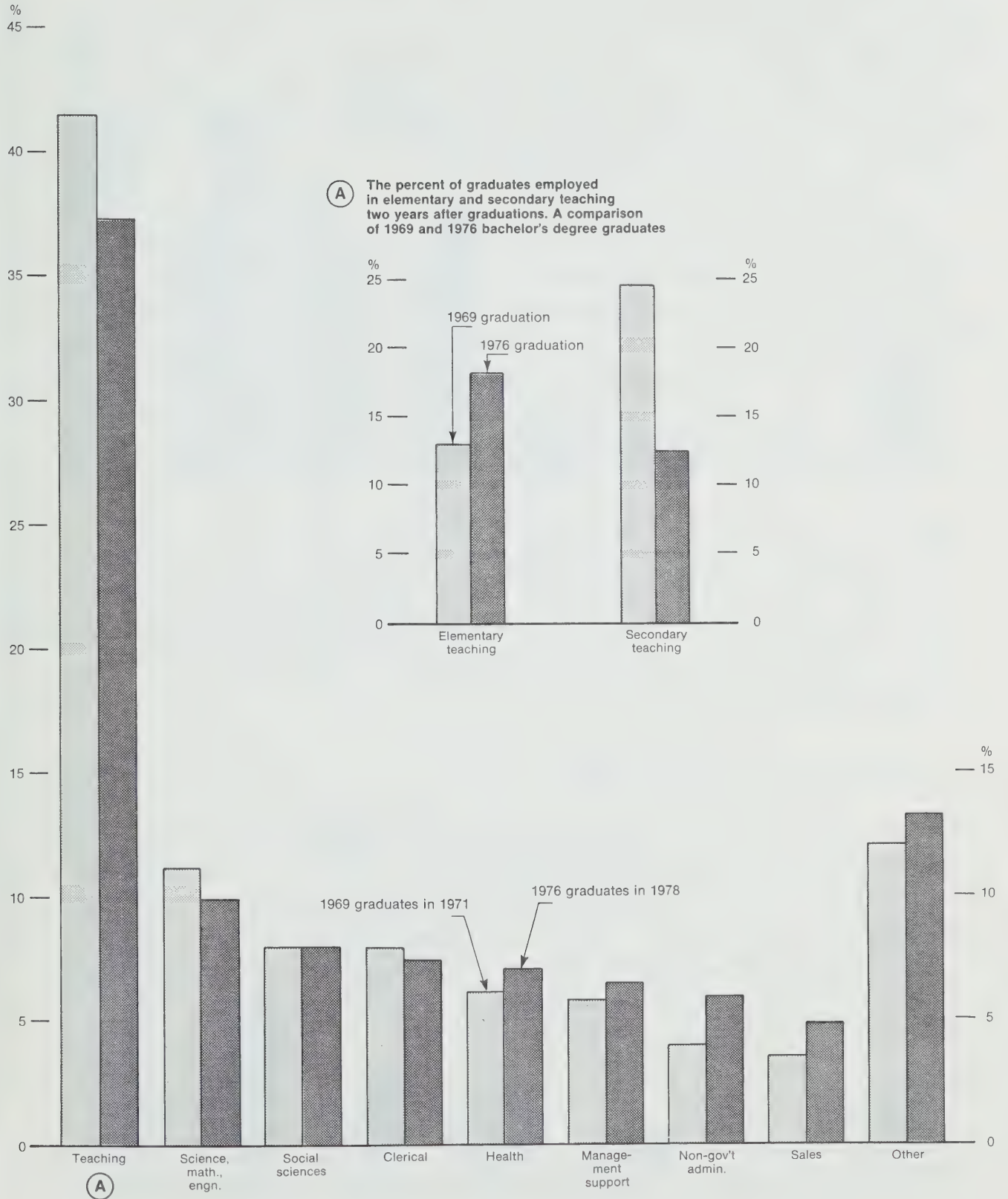
Many graduates in the late 1970s may have chosen teaching at least partly because of the salaries offered. In both 1971 and 1978, graduates who entered teaching had earnings above the average for all graduates. The salary differential was particularly noticeable among 1976 humanities graduates employed in 1978: those in teaching earned 40 per cent more in 1978 than those employed in other occupations.¹⁰ Social science graduates (excluding law and economics) earned 32 per cent more in teaching than in other occupations.

It is particularly interesting that teaching remained important in a period of rapidly declining elementary enrolment. This may have been because of a change in regulations and hiring practices at the elementary level. At one time, many elementary teachers came from teachers' colleges rather than universities. During the early 1970s, some provinces implemented a ruling that required new elementary teachers to have a university degree. In effect, this ruling expanded the job market for university graduates. Furthermore, even in those provinces where a degree was not formally required, the increasing supply of teachers relative to demand likely meant that those with degrees were hired before candidates lacking such certificates.

The influence of these changes in hiring practices on the employment of degree holders in teaching is demonstrated in the inset of Chart 1. Even

¹⁰ They did, of course, require further education beyond the bachelor's degree in humanities to obtain a teaching certificate. For details on salaries earned in various occupations, see Clark and Zsigmond (1981), pp. 161 and 296.

Chart — 1
Employment by Occupation of Bachelors Graduates Two Years
After Graduation, 1971 and 1978



though elementary enrolment fell 13 per cent between 1971 and 1978, the proportion of bachelor's graduates finding employment at the elementary level actually rose from 13 per cent to 18 per cent. It is estimated that the actual number of recent bachelor's graduates hired as elementary teachers doubled during that period. It is probable that the expansion of the elementary teaching job market for graduates was temporary, but later data are not available to confirm this.

At the secondary level, on the other hand, where there was no change in hiring practice and where the level of enrolment remained approximately the same in 1971 and 1978, the proportion of graduates hired as teachers fell from 25 per cent to 13 per cent, and there was an estimated decrease of 20 to 30 per cent in the number of bachelor's graduates hired as secondary teachers. Thus, while in the early 1970s more graduates entered secondary than elementary teaching, by the late 1970s the opposite was the case.

Other major occupations for bachelor's graduates are shown in Chart 1. After teaching, the greatest opportunities for employment were in engineering/science/math occupations (10 per cent), the social sciences¹¹ (8 per cent), and clerical work (7 per cent). While there was some change between 1971 and 1978 in the distribution, the ranking of the occupations did not change significantly.

B. Master's and Doctoral Graduates

Teaching was also the principal occupation for master's graduates in 1971 (31 per cent, see Chart 2). Ten per cent were teaching at the university level, 7 per cent at the college vocational level, and 14 per cent at the elementary-secondary level. Next in importance were occupations in natural sciences, math, and engineering (20 per cent), managerial and administrative occupations (17 per cent), and the social sciences (14 per cent).

¹¹ Including economists, sociologists, counsellors, lawyers, librarians.

Chart — 2

**Employment by Occupation of Master's Graduates
Two Years After Graduation, 1971 and 1978**

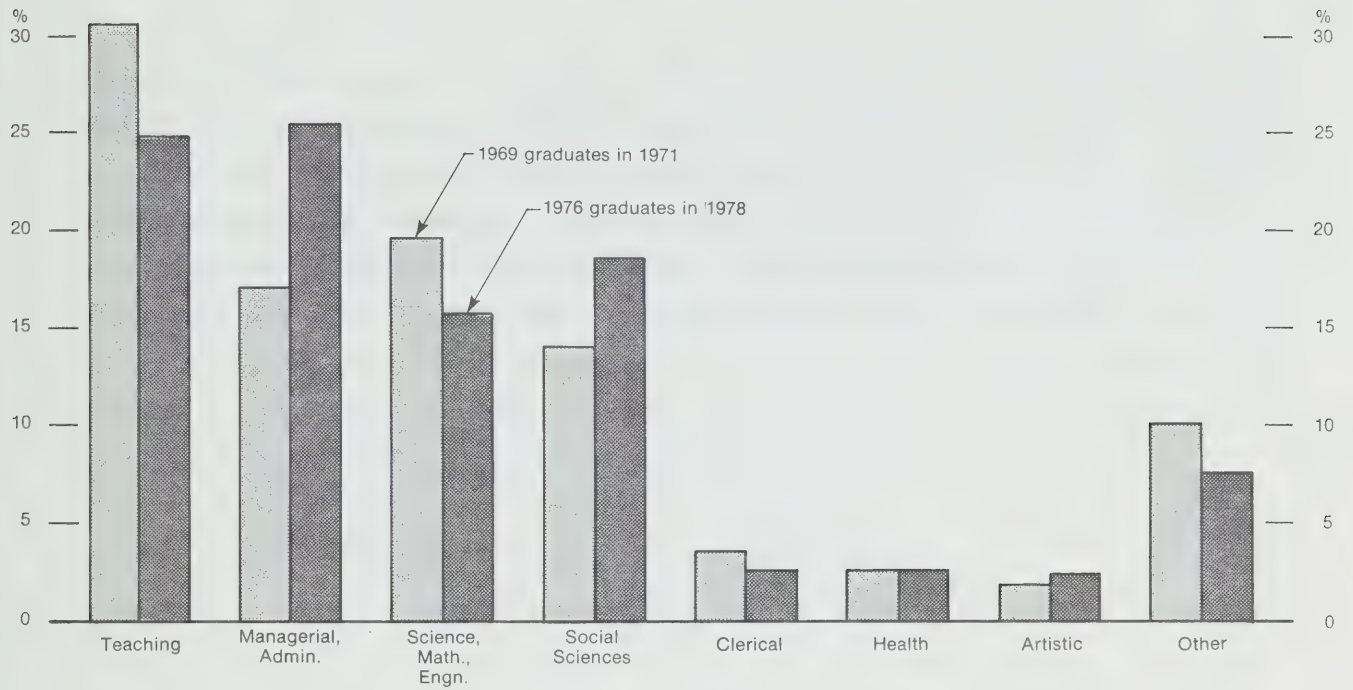
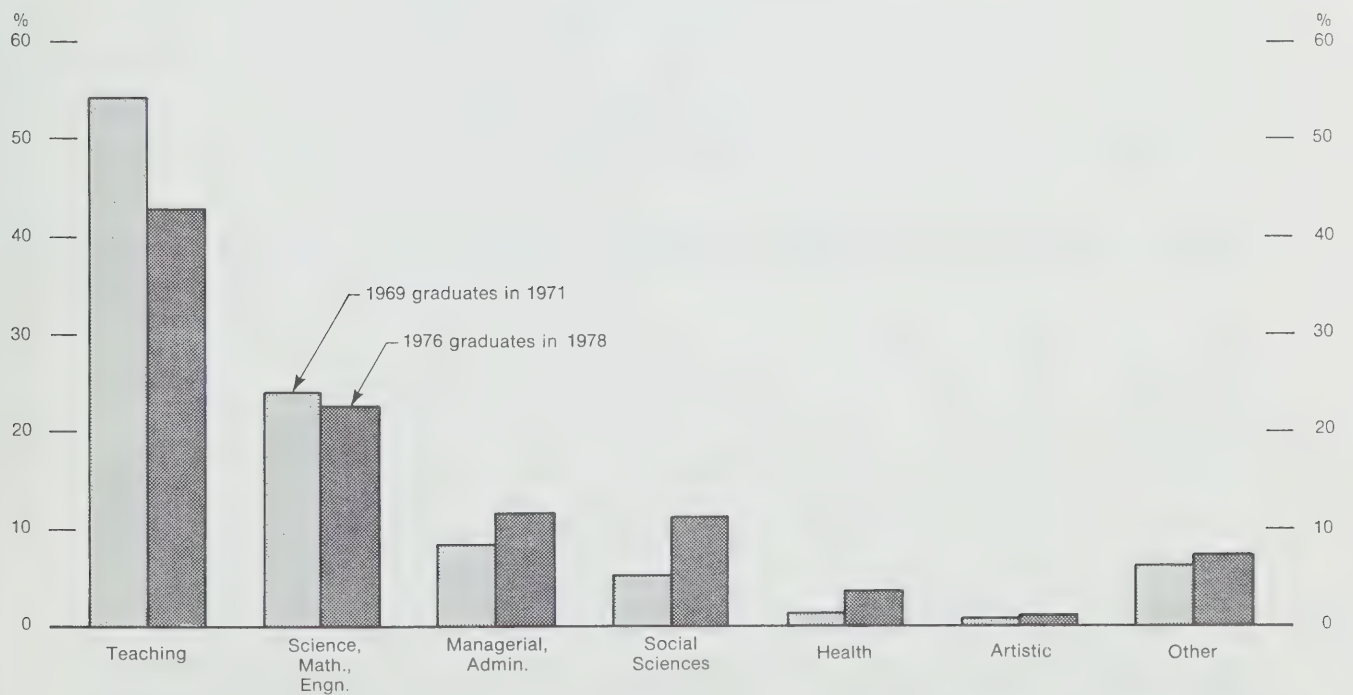


Chart — 3

**Employment by Occupation of Doctoral Graduates
Two Years After Graduation, 1971 and 1978**



By 1978 teaching had fallen to 25 percent for master's graduates, the same proportion as management. Occupations in the social sciences rose to 18 per cent from 14 per cent, and in the natural sciences, math, and engineering, they dropped from 20 per cent to 16 per cent.

Teaching remained the chief occupation for doctoral graduates in both time periods: 54 per cent in 1971; 43 per cent in 1978 (see Chart 3). Doctoral graduates employed in university teaching two years after graduation fell from 50 per cent in 1971 to 39 per cent in 1978. Occupations in the natural sciences, math, and engineering were second in importance for doctoral graduates, employing 24 per cent of the total employed in 1971, and 23 per cent in 1978.

2. Men and Women

Differences were apparent in the occupations entered by men and women bachelor's graduates. For both, teaching was still the principal occupation. Beyond this, however, sharp divisions occurred. The divergence may be traced back to the choice of field of study, which had a strong influence on the occupation in which the graduate would ultimately work. In 1978, more than a quarter (26 per cent) of the 1976 male bachelor's graduates were teachers; 15 per cent were in engineering/mathematics/science-related occupations; 18 per cent in management/administration; 8 per cent in social science occupations; 6 per cent in sales occupations; and the remaining 27 per cent were in other occupations (see Table 1).

Female graduates were more concentrated: half were teachers, 10 per cent were clerks, 9 per cent were in the health field, and the remaining 23 per cent were in other areas.

The differences between men and women in the type of occupations entered were not as great at the master's and doctoral level as at the bachelor's level (Table 1). The major difference between the two sexes was that women were more likely than men to enter occupations in the social sciences¹² and men were more likely than women to enter occupations in science/engineering/math or management/administration. The proportion entering teaching was not very different between the two sexes at the master's and doctoral levels, although a slightly larger proportion of women became teachers.

For more information on the differences in occupations of employment for men and women, see Appendix C.

¹² The occupations included librarians, social workers, and psychologists/sociologists.

Table 1. Employment by Occupation of Bachelor's, Master's, and Doctoral Graduates
Two Years after Graduation, by Sex, 1971 and 1978

		Number	Teaching	Management/		Sci./Engn./ Math	Social Sciences***	Health	Other
				Admin.	Math				
Bachelor's and 1st Professional	Male	1971*	25040	32.2	13.3	15.5	8.7	5.1	25.2
		1978**	26090	25.8	18.0	15.1	8.3	5.4	27.4
	Female	1971	13219	59.0	3.9	3.0	6.9	8.2	19.0
		1978	23330	50.2	8.7	4.1	7.8	8.8	20.4
		in Univ.	Teaching		Management/		Sci./Engn./ Math	Occns.	Other
			Other	Total	Admin.	Soc. Sci.			
Master's	Male	1971	3263	12.5	19.0	17.7	19.2	11.1	20.5
		1978	4191	5.0	18.1	29.5	19.8	12.2	15.4
	Female	1971	823	9.0	23.0	10.0	4.8	32.2	21.0
		1978	1824	4.8	23.9	16.0	6.4	32.5	16.4
Doctoral	Male	1971	577	53.7	4.5	6.7	22.8	4.8	7.5
		1978	736	38.1	3.9	11.7	26.3	8.4	11.6
	Female	1971	57	54.1	2.0	11.7	11.7	-	20.6
		1978	148	41.9	3.2	11.8	4.7	23.4	15.0

* includes all of Canada

** includes all of Canada except Quebec

*** includes economists, sociologists, psychologists, social workers, librarians, counselors, etc.

3. Relationship between Field of Study and Occupation

A. Bachelor's Graduates

The relationship between field of study and occupation was examined in two ways: by principal occupation of employment, and by degree of concentration of graduates in one or a few occupations.

(i) Principal Occupation

Many fields of study appeared to lead primarily to one principal occupation or group of occupations.

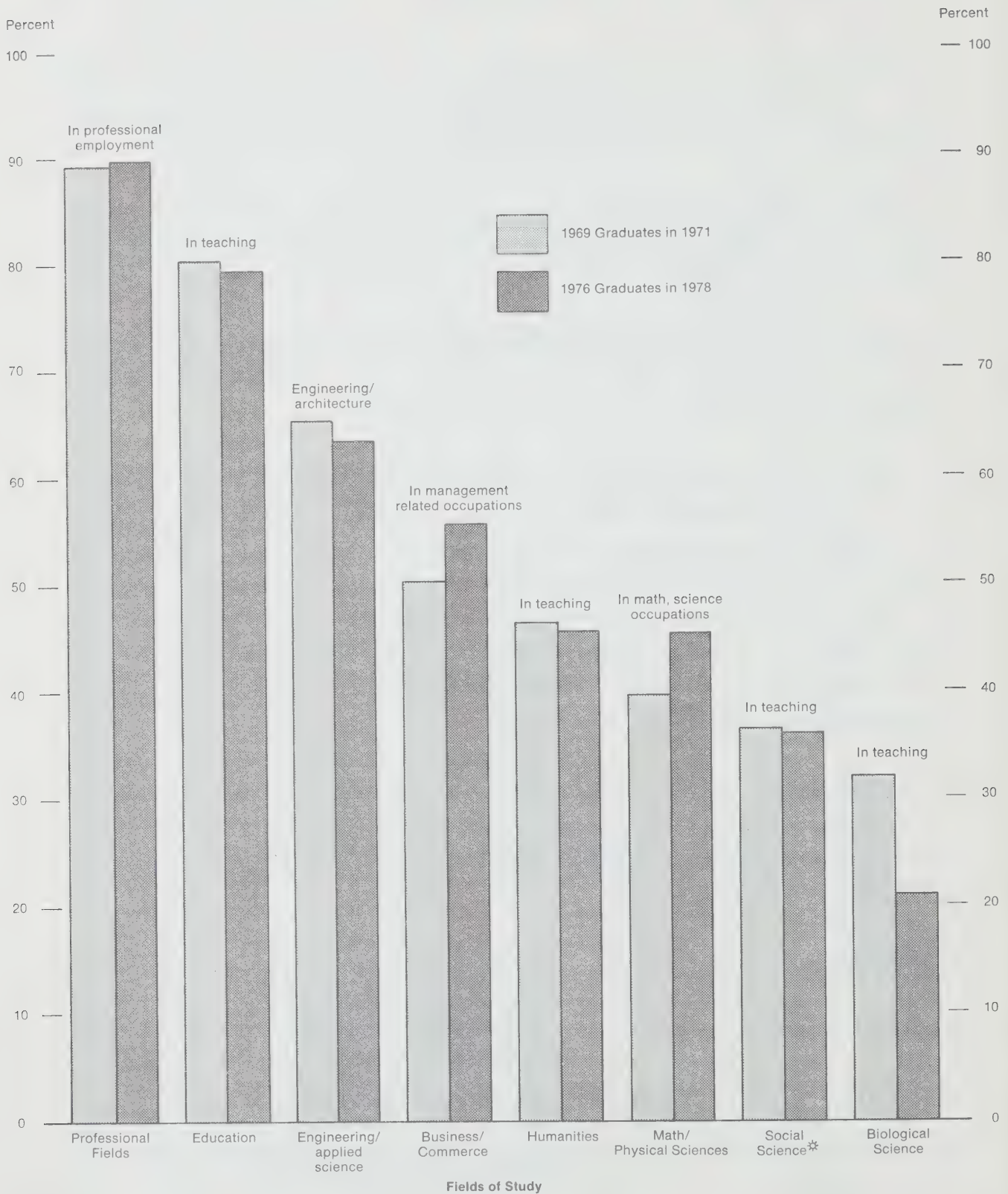
The principal occupation of bachelor's graduates of eight major fields--that is, the occupation in which most graduates of a specific field were employed--were determined and are shown in Chart 4.

Not surprisingly, graduates from the professional fields of study tended to enter a single occupation related to their training. Approximately 90 per cent entered a related occupation in both 1971 and 1978. Graduates of education also tended to concentrate in a particular occupation: in both 1971 and 1978 approximately 80 per cent entered teaching. (This is another indication that, in spite of the decline in elementary school enrolment and a levelling off in secondary school enrolment, the market for education graduates in the late 1970s was strong.)

In all but one of the remaining fields, the proportion of recent graduates entering the principal occupations remained surprisingly constant between 1971 and 1978, despite concern expressed during that period about an oversupply of graduates:

Engineering and Applied science	- 65 per cent entered engineering or architecture
Business/Management	- 55 per cent entered a management/administration related occupation
Humanities	- 45 per cent entered teaching
Math/Physical sciences	- 40 per cent to 45 per cent entered an occupation in science or mathematics
Social sciences	- 35 per cent entered teaching

Chart — 4
Proportion of Bachelor's Graduates in the Principal Occupation
Two Years after Graduation, by Field of Study, 1971 and 1978



*excluding law and economics

In the highly aggregated eight major fields, there was only a significant change in the proportion of graduates in principal occupations between 1971 and 1978 in the biological sciences. In 1971, 32 per cent entered teaching; by 1978, this had dropped to 21 per cent. (There were other indicators as well, which will be discussed later in this section, that the labour market for biological science graduates weakened considerably during the 1970s.)

Among the more detailed fields of study, there was a statistically significant change between 1971 and 1978 in the proportion of graduates employed in the principal occupation for 12 of 35 fields (see Table 2). Hence, there was a relatively stable relationship between field of study and principal occupation for the majority of fields.

(ii) Degree of Concentration

But what of the link between field of study and all occupations? The degree of concentration of graduates in one or a few occupations offers another perspective on this relationship.¹³ This was measured using an "index of industrial concentration" (described in Appendix E). The highest value of the index is 1.0, which would be achieved if all graduates were employed in a single occupation. The lowest value is 0, and would be achieved if graduates were employed equally in all occupations.

A high value indicates a strong relationship between a field of study and a single occupation or a few occupations. A lower index value indicates a wider dispersion of graduates in occupations.

Table 2 shows the index for 35 fields of study, as well as the percentage of graduates in the principal occupation in 1971 and 1978. The fields are listed in order of decreasing concentration and are grouped in three relative and somewhat arbitrary categories according to their degree of

¹³ A more technical analysis, using the same data, of the relationship between occupations and field of study can be found in "The Use of Fixed Coefficient Matrices to Relate Occupation and Field of Study in Manpower Requirements Models," also by G. Picot, to be published in Labour Market Analysis, Statistics Canada, Ottawa, 1983.

Table 2. Principal Occupation and Index of Occupational Concentration for Bachelor's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978

	Field of Study	Principal Occupation	Proportion in principal occupation		Index of occupational concentration	
			1971	1978	1971	1978
H I G H	Dentistry	Dentistry	94.2	96.9	.99	.99
	Medicine	Medicine	84.1	89.6	.98	.98
	Law	Law	94.1*	88.2	.99	.97
	Pharmacy	Pharmacy	82.4*	93.4	.96	.97
	Nursing	Nursing	48.1*	83.4	.95	.96
	Mechanical Engn.	Engineering	63.5	68.8	.91	.94
	Teaching Ed.	Teaching	76.5	75.0	.95	.93
	Civil Engn.	Engineering	81.3*	67.1	.97	.93
	Chemical Engn.	Engineering	56.8	62.9	.89	.91
	Electrical Engn.	Engineering	63.5	56.2	.93	.90
M E D I U M	Other Engn.	Engineering	43.4*	61.0	.88	.88
	French	Teaching	55.9	60.6	.83	.88
	Forestry/Arch.	Engineering, Arch.	48.8	37.3	.94	.86
	Business	Management Support	46.0	41.0	.82	.86
	Modern Languages	Teaching	41.8	44.3	.89	.86
	Mathematics	Math/Systems Analysis	29.8*	39.3	.85	.85
	Geology	Physical Sciences	63.0	46.4	.96	.83
	Religion	Religion	48.8	47.6	.90	.83
	Physical Ed.	Teaching	73.5*	57.2	.95	.83
	English	Teaching	46.1	46.5	.82	.80
	Sociology	Teaching	33.0	37.3	.80	.80
L O W	Geography	Teaching	60.7*	47.2	.90	.78
	Chemistry	Physical Sciences	31.1	31.4	.84	.78
	Physics	Teaching	22.8*	34.4	.79	.78
	Household Sci.	Teaching	57.2*	35.5	.92	.77
	Other Social Sci.	Teaching	27.3	33.3	.77	.76
	Psychology	Teaching	33.4	32.6	.80	.75
	Economics	Management Support	20.0	24.6	.72	.75
	No specialization	Teaching	41.3	33.4	.78	.75
	History	Teaching	39.5	36.1	.79	.74
	Fine Arts	Teaching	33.1	31.0	.90	.74
	Political Science	Teaching	26.9	34.7	.74	.69
	Philosophy	Teaching	32.3	34.9	.85	.66
	Biology	Teaching	18.9*	15.2	.74	.66
	Agric./Bio.Sci.	Life Sciences	26.6*	9.1	.76	.66
	All Graduates	Teaching	41.5	37.3	.75	.72

* Indicates there was a statistically significant difference in the percentages between the two years. There was not a significant difference between all other for percentages.

concentration in 1978: high (.9 to 1.0), medium (.8 to .9) and low (below .8).

As indicated by the principal occupations chart, the professional fields (such as health and law) and engineering had the highest degree of occupational concentration, with from 60 per cent to 97 per cent of the graduates in a single occupation. There was thus a strong relationship between field of study and occupation in these fields. The social and biological sciences had a low index value and hence did not exhibit such a strong tie with any single occupation.

Graduates in these fields found employment in a wide range of occupations, some of which--as will be seen later--did not require a postsecondary education. Overall, the degree of occupational concentration fell slightly between 1971 and 1978 as the index fell from .75 to .72. This resulted largely from the small decline in the number of graduates who became teachers. Graduates who might have become teachers were forced to find employment in other occupations.

B. Master's and Doctoral Graduates

The relationship between field of study and occupations for master's and doctoral graduates is not presented in as much detail as for bachelor's graduates because of the smaller sample size. The occupational distribution for various fields of study is shown in Tables 3 and 4. The categories are very highly aggregated, again because of relatively small sample sizes. In general, the type of occupation entered by master's and doctoral graduates changed much more between 1971 and 1978 than it had for bachelor's graduates.

For master's graduates, the proportions entering their principal occupations were as follows:

<u>Field of Study</u>	<u>Principal Occupation</u>	<u>Per Cent</u>	
		<u>1971</u>	<u>1978</u>
Engineering/Applied Sci.	Engn./Sci./Math	70	72
Business	Mgmt/Admin.	41	55
Math/Physical Sciences	Sci./Engn./Math	45	53
Education	Teaching	39	52
Health	Health	66	42
Social Sciences	Soc. Science	43	40
Humanities	Teaching	59	33
Biological Sciences	Sci./Engn./Math	51	33

For doctoral graduates, the proportions entering their principal occupation were:

<u>Field of Study</u>	<u>Principal Occupation</u>	<u>Per Cent</u>	
		<u>1971</u>	<u>1978</u>
Humanities	Teaching	85	73
Education	Teaching	57	58
Engineering/Applied Sci.	Engn./Sci./Math	63	56
Math/Physical Sciences	Teaching (1971)	51	
	Sci./Math (1978)		49
Social Sciences	Teaching	52	47
Biological Sciences	Teaching (1971)	50	
	Sci./Engn./Math (1978)		40

Table 3. Employment by Occupation of Master's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978

Field of Study	Year	Number	Commun.										Other non HQM Occns			
			Element/ College/		University Teaching	Total Teaching	Social Science	Management/ Admin.	Sci./ Engn./ Math	Religion	Arts	Clerical		Sales	Service	
			Secondary Teaching	Other Teaching												Health
-----Per cent distribution-----																
Business/ Commerce	1971	664	5.3	—	2.6	9.0	7.2	40.7	—	18.0	—	—	4.9	12.1	—	7.5
	1978	1,045	2.3	2.7	1.9	6.9	9.4	54.7	—	13.8	—	—	4.2	6.8	—	2.3
Education	1971	927	4.4	29.2	5.4	39.0	12.5	40.5	—	—	—	—	—	—	—	2.5
	1978	1,345	3.8	38.5	9.2	51.5	11.6	30.9	—	—	—	—	—	—	—	1.9
Soc. Sci.	1971	1,008	6.9	4.7	6.8	18.4	43.0	12.4	—	7.0	—	2.8	—	—	—	9.2
	1978	1,356	4.8	5.9	1.9	12.6	40.3	20.8	2.8	10.6	—	—	2.1	2.7	1.7	4.5
Health	1971	89	8.3	—	11.1	23.8	—	—	65.8	10.4	—	—	—	—	—	—
	1978	122	20.2	—	9.4	29.6	5.7	10.7	42.4	7.4	—	—	—	—	2.1	2.1
Engn./App. Sci.	1971	610	9.8	—	3.3	13.1	2.2	1.7	—	69.7	—	—	—	—	—	7.6
	1978	456	—	—	—	5.4	—	15.5	—	72.3	—	—	—	—	—	—
Math/ Phys.Sci.	1971	415	23.0	9.1	8.0	40.1	—	—	—	45.4	—	—	—	—	—	11.6
	1978	387	12.2	12.3	2.1	26.6	1.6	10.6	—	53.0	—	—	2.1	—	—	3.4
Bio. Sci./ Agric.	1971	254	7.8	18.7	—	31.2	—	1.5	—	51.1	—	—	—	—	—	—
	1978	235	11.6	6.0	—	20.8	—	7.1	13.6	33.4	—	—	—	—	—	16.9
Humanities	1971	844	17.2	29.5	12.5	59.2	6.9	5.5	—	—	8.0	—	10.4	—	—	6.6
	1978	942	4.7	23.2	5.3	33.2	27.3	9.6	—	—	4.7	6.4	8.5	3.8	—	2.9
TOTAL (nine prov.)	(Can.)1971	4,844	9.8	14.0	6.7	30.5	14.1	17.2	1.9	19.8	1.9	0.9	3.6	2.8	0.8	6.7
	1978	6,035	5.0	15.5	4.4	24.9	18.4	25.4	2.5	15.7	1.0	1.9	2.8	2.8	0.9	3.7

---indicates the number was too small to be a statistically reliable estimate.

Table 4. Employment by Occupation of Doctoral Graduates Two Years after Graduation, by Field of Study, 1971 and 1978

Field of Study	Year	Number	University Teaching	Elementary Secondary Teaching	Commun. College Other Teaching	Total Teaching	Social Science	Sci./Engrn./Math	Management/Admin.	Health	Arts	Other non-HQM Occns.
-----Per cent distribution-----												
Education	1971	70	47.4	---	---	56.6	---	---	25.8	---	---	17.6
	1978	70	51.9	---	---	57.7	---	---	33.3	---	---	---
Social Sci.	1971	151	48.1	---	---	51.6	21.6	---	12.9	---	---	---
	1978	260	44.3	---	---	46.5	32.1	---	11.8	---	---	---
Engrn./Applied Sci.	1971	110	33.5	---	---	33.5	---	63.0	---	---	---	---
	1978	98	15.8	---	---	17.7	3.1	55.8	16.5	---	---	---
Math/Phys.Sci.	1971	127	45.0	---	---	50.5	---	36.6	---	---	---	9.6
	1978	185	27.1	---	---	29.3	---	49.2	8.1	---	---	10.4
Bio. Sci.	1971	137	48.0	---	---	49.8	---	33.0	---	---	---	11.5
	1978	92	15.6	---	---	23.7	---	40.1	8.2	12.8	---	12.0
Humanities	1971	101	81.0	---	---	84.8	---	---	14.2	---	---	---
	1978	117	65.8	---	---	73.2	---	---	5.8	---	---	---
TOTAL (Can.) (nine prov.)	1971	714	50.5	1.3	2.2	54.0	5.2	24.0	8.3	1.3	---	6.4
	1978	892	39.0	1.8	1.9	42.7	11.2	22.5	11.6	3.8	---	7.3

---indicates the number was too small to be a statistically reliable estimate.

4. Change in Type of Occupation Entered in 1971 and 1978

A. Bachelor's Graduates

The employment of bachelor's graduates from particular fields of study in major occupations is shown in Chart 5 and Table 5. To give a measure of the change in type of occupation, an index of dissimilarity¹⁴ in the occupational distributions of 1971 and 1978 was calculated for each field study. The higher the index, the greater the change between 1971 and 1978 in the distribution of recent graduates among occupations. The fields of study are listed in order of increasing values:

Education	4.0
Engineering	7.5
Humanities	8.2
Business/Commerce	10.3
Biological Sciences	13.6
Math/Physical Sciences	14.5
Social sciences	14.9
No specialization	28.0

Overall, education graduates experienced the least change in the type of occupation entered in 1971 and 1978. The greatest change was among graduates in math and physical sciences, the biological and social sciences, and those with no specialization. In all cases where the type of occupation entered changed significantly, a drop in teaching employment also occurred. This would suggest the diminished job market for teachers was a relevant factor in forcing more graduates than previously from fields other than education to find different occupations.

Among graduates in math and physical science, for example, fewer found employment in teaching in 1978 and more found work in math and physical science occupations (from 40 per cent in 1971 to 46 per cent in 1978).

But while math and physical science graduates found employment in occupations related to their field to compensate for their lost teaching

¹⁴ This index is often used in demography and is simply the sum across all occupations of the absolute value of the difference between the value in 1971 and 1978. This sum is then divided by two.

Chart — 5 (1 of 2)

**Employment of Bachelor's Graduates Two Years After Graduation,
by Field of Study and by Occupation, 1971 and 1978**

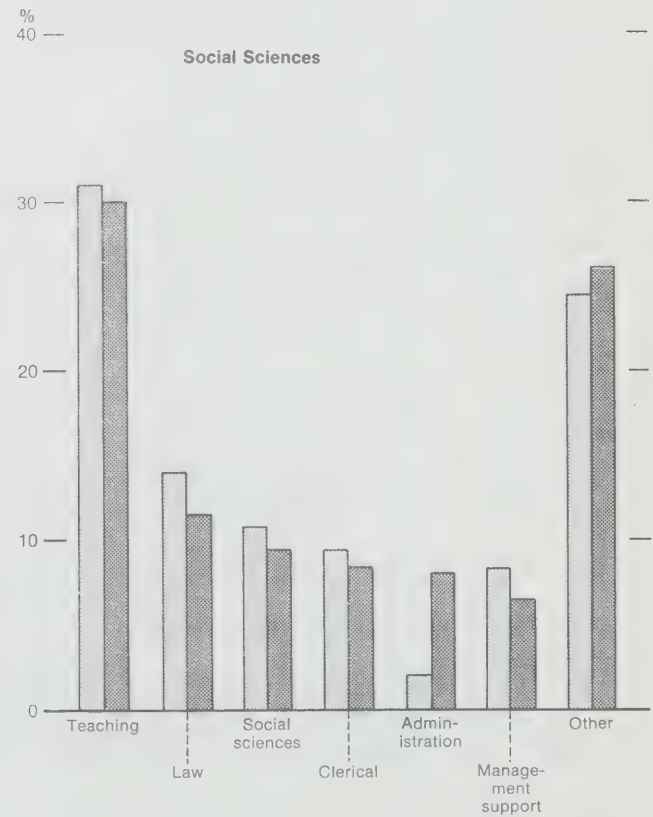
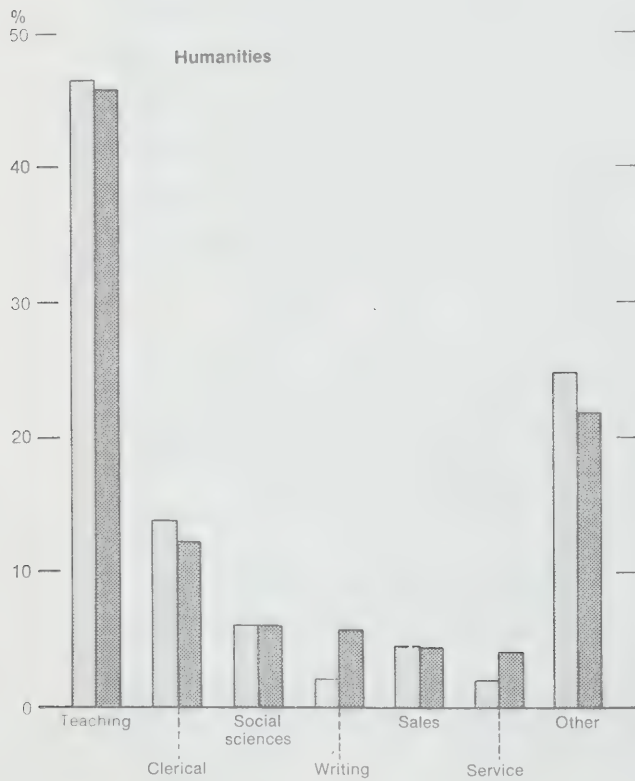
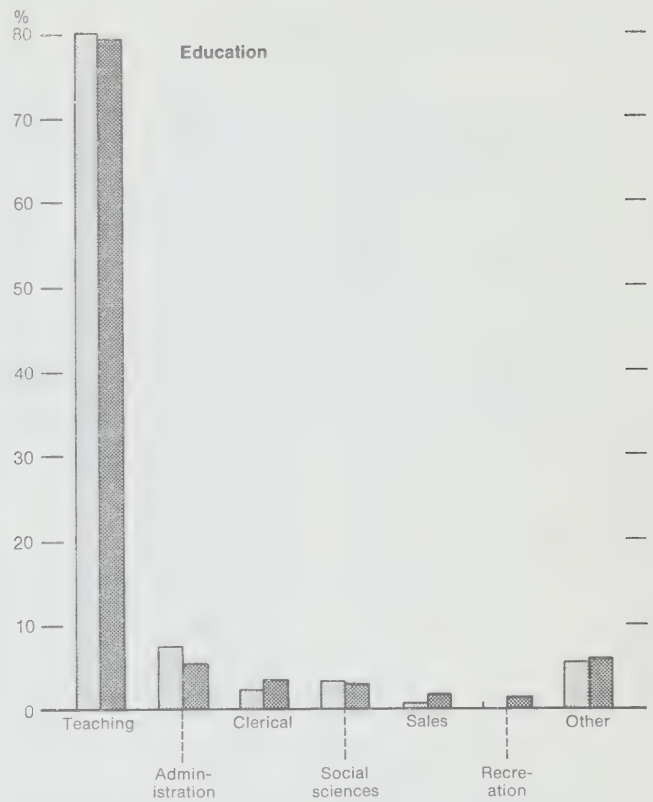
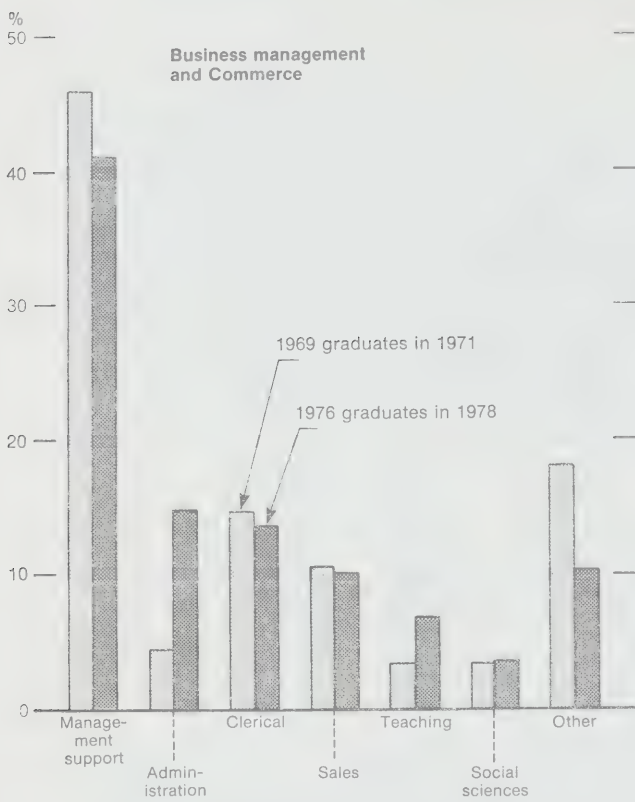


Chart — 5 (2 of 2)

**Employment of Bachelor's Graduates Two Years After Graduation,
by Field of Study and by Occupation, 1971 and 1978**

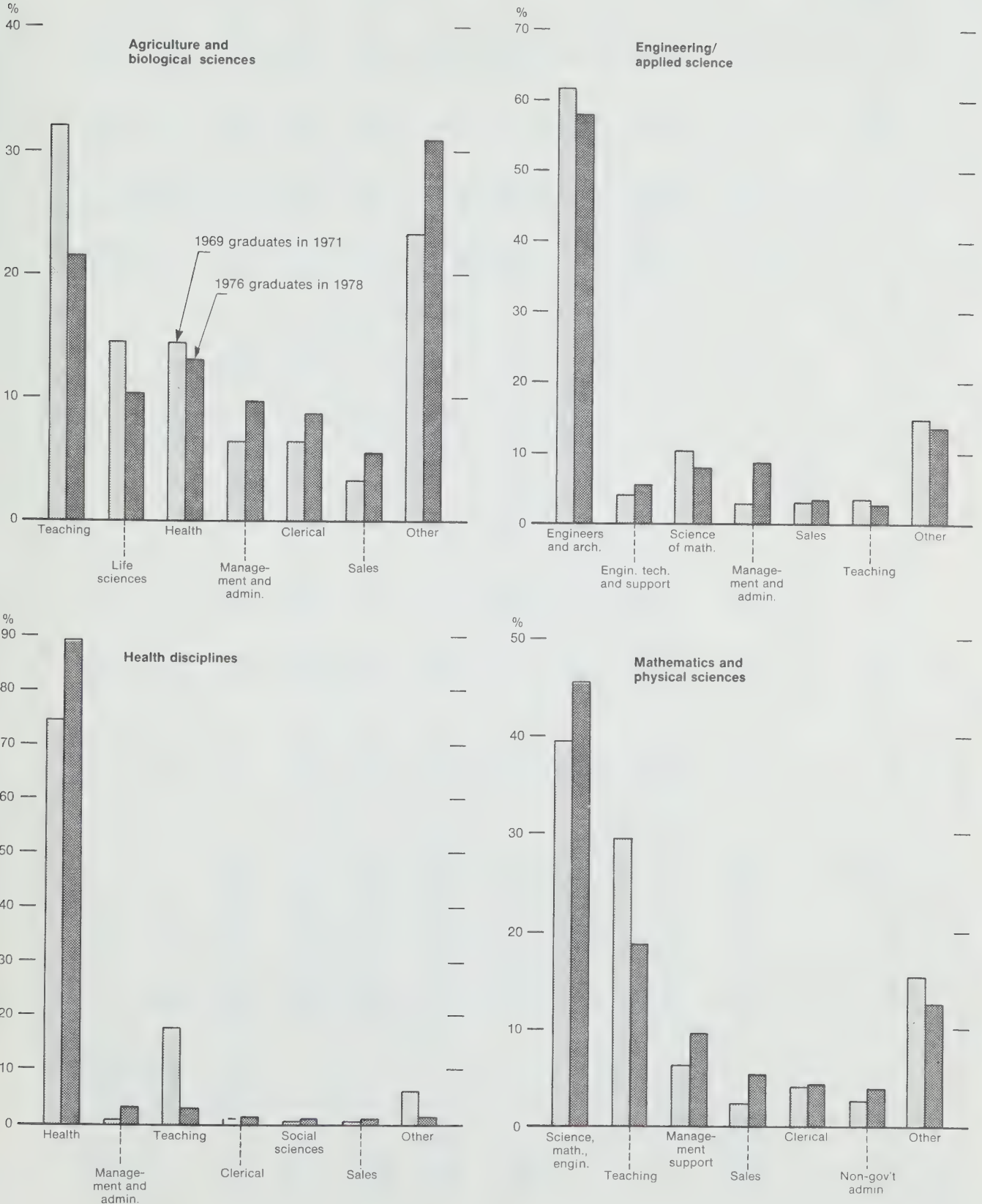


Table 5. Employment by Occupation of Bachelor's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978

Field of Study	Year	Number	Management/ Admin.	Teaching	Social Science	Health Sci./ Engn./ Math	Artistic	Clerical	Sales Service	Other Non-HQM Occns	TOTAL %	Index of Dissimi- larity
							---Per cent distribution---					
Business/ Commerce	1971	2,101	50.7	3.2	3.3	---	---	4.9	---	10.5	9.7	100
	1978	3,604	56.3	7.0	3.5	---	---	3.2	---	10.1	2.2	100
Education	1971	7,976	7.6	80.4	3.3	---	---	---	---	---	3.9	100
	1978	10,274	5.2	79.5	2.9	0.6	0.6	0.9	---	1.8	1.2	100
Soc. Sci.	1971	7,746	11.0	31.0	24.7	3.3	1.6	3.8	---	4.2	2.6	100
	1978	12,885	16.4	30.0	21.0	1.6	1.2	3.8	---	6.6	4.2	100
Health	1971	2,147	---	17.5	---	74.5	---	---	---	---	3.2	100
	1978	2,778	3.1	2.9	---	89.2	---	---	0.9	---	---	100
Engn./ App. Sci.	1971	2,609	2.8	3.5	---	---	---	75.8	---	3.1	8.1	100
	1978	2,684	8.7	2.7	---	---	---	71.6	---	3.4	2.0	100
Math./ Phys. Sci.	1971	2,979	9.3	29.7	2.2	---	---	39.7	---	2.3	10.1	100
	1978	2,897	14.1	18.8	---	---	---	45.7	---	5.2	1.9	100
Bio. Sci./ Agric.	1971	2,046	6.5	32.0	5.0	14.4	---	18.5	---	3.2	12.3	100
	1978	3,802	9.8	21.5	3.7	13.1	---	18.0	---	5.7	4.5	100
Humanities	1971	7,132	8.5	46.6	6.1	---	2.7	1.2	---	4.6	2.0	100
	1978	7,785	9.6	45.8	6.1	0.9	7.4	1.4	---	4.4	4.0	100
No Specialization	1971	3,000	6.6	43.9	5.6	---	---	6.2	---	6.3	3.4	100
	1978	587	8.6	34.9	11.9	8.9	---	10.5	---	11.0	6.2	100
TOTAL (Canada) (nine provinces)	1971	38,254	10.1	41.5	8.1	6.2	1.3	11.2	---	3.5	1.7	100
	1978	49,585	13.6	37.3	8.0	7.0	2.3	9.9	---	4.8	3.1	100

---indicates the number was too small to be a statistically reliable estimate.

employment, graduates in the biological sciences appear to have been more adversely affected. While the reduction in teaching opportunities caused a fall in the proportion of biological science graduates employed in teaching (from 32 to 21 per cent as pointed out earlier), as Chart 4 also pointed out, teaching continued to be the principal occupation for these graduates.

B. Master's and Doctoral Graduates

The major change in occupation for master's and doctoral graduates was the move away from teaching. The decline in 1978 from 1971 in the proportion of graduates entering teaching was greater at the doctoral and master's level (falling by 11.3 and 5.6 percentage points respectively) than at the bachelor's level (with a decrease of 4.2 percentage points).

Traditional patterns may be observed here. Doctoral graduates most often entered teaching. At the master's level, graduates were less likely to become teachers. But the bachelor's graduates in most disciplines, being less well qualified than master's to enter into practice, predominantly found elementary and secondary school teaching positions.

5. Graduates and Highly Qualified Manpower Occupations

Analysts at the Ministry of State for Science and Technology (MOSST), in developing a model of highly qualified manpower demand, have classified occupations into two groups according to the level of education required: 1) those that require at least two years of postsecondary education; and 2) those that do not. The occupations in the first group are referred to as highly qualified manpower (HQM) occupations. Those in the second group are non-highly qualified manpower (non-HQM) occupations.¹⁵

A. Bachelor's Graduates

The proportion of bachelor's graduates in non-HQM occupations two years after graduation rose from 21 per cent in 1971 to 26 per cent in 1978. As the number of degree holders increased very rapidly during the 1970s and employment opportunities in the public sector industries declined,¹⁶ the fact that this proportion increased is not surprising.

Chart 6 shows graphically that the proportion of graduates who found non-HQM jobs varied according to their field of study: the professional fields, education, and engineering exhibited the lowest proportion, with 5 to 20 per cent of graduates in non-HQM jobs, and the social sciences, humanities, and biological sciences, the highest, with 30 to 46 per cent in such jobs.

Only in the business/commerce field did the proportion of graduates in non-HQM occupations decline.

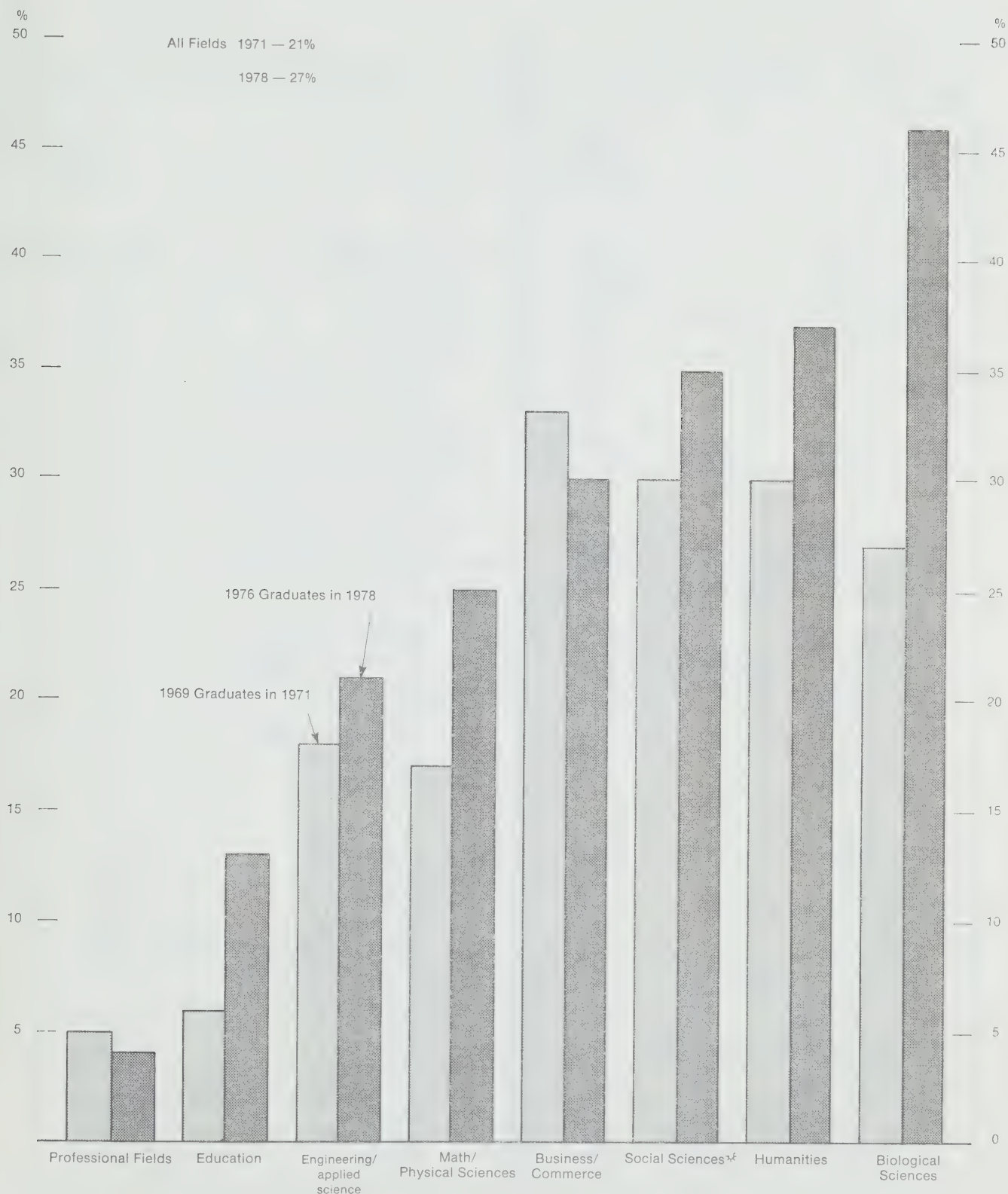
For those who wish more detail, Table 6 shows the proportion of bachelor's graduates in HQM occupations in both 1971 and 1978 for 35 fields of study.

¹⁵ The MOSST HQM Demand Model Methodology, Universities Branch, Ministry of State for Science and Technology, Ottawa, 1980. For more information on this classification and for a listing of codes assigned to occupations, see Appendix D.

¹⁶ See Section III of this report.

Chart — 6

Bachelor's Graduates in Non-HQM Occupations Two Years After Graduation, by Field of Study, 1971 and 1978



**excluding law

Table 6. Bachelor's Graduates in HQM Occupations, Rank-Ordered by Detailed Field of Study, 1971 and 1978

1969 Graduates in 1971			1976 Graduates in 1978		
Rank	Field of study	Per cent HQM	Rank	Field of study	Per cent HQM
1.	Dentistry	98.9	1.	Dentistry	97.8
2.	Nursing	97.2	2.	Medicine	96.8
3.	Pharmacy	96.8	3.	Nursing	95.9
4.	Teacher Education	95.2	4.	Pharmacy	95.0
5.	Medicine	95.1	5.	Law	90.4
6.	Law	94.4	6.	Teacher Education	90.1
7.	Fine Arts	93.5	7.	Civil Engineering	85.4
8.	Religion	93.3	8.	Mathematics	82.2
9.	Household Science	90.3	9.	Chemical Engineering	79.8
10.	Civil Engineering	86.4	10.	Mechanical Engineering	79.3
11.	Mathematics	86.0	11.	Other Engineering	79.3
12.	Electrical Engineering	85.3	12.	Electrical Engineering	78.1
13.	Physical Education	85.0	13.	Physical Education	75.2
14.	Mechanical Engineering	84.7	14.	French	73.3
15.	Geography	82.1	15.	Modern Languages	72.3
16.	Chemical Engineering	80.4	16.	Forestry, Architecture	71.2
17.	Forestry, Architecture	77.5	17.	Household Science	70.6
18.	Geology	77.3	18.	Religion	70.6
19.	Other Engineering	74.4	19.	Business, Commerce	69.6
20.	Sociology	73.7	20.	Geography	68.6
21.	Physics	73.5	21.	Geology	68.3
22.	Psychology	72.9	22.	Psychology	67.8
23.	French	72.6	23.	Sociology	67.0
24.	English	69.3	24.	English	66.5
25.	Modern Languages	69.0	25.	Philosophy	64.7
26.	History	68.9	26.	Economics	64.5
27.	Biology	67.7	27.	Other Social Sciences	64.5
28.	Business, Commerce	66.9	28.	No Specialization	63.8
29.	Philosophy	66.0	29.	Fine Arts	62.1
30.	Agric/Misc. Biol. Sci.	65.3	30.	Chemistry	60.5
31.	Economics	64.9	31.	History	57.3
32.	Chemistry	62.0	32.	Agric/Misc. Bio. Sci.	54.5
33.	No Specialization	61.3	33.	Physics	54.4
34.	Other Social Science	60.0	34.	Political Science	54.2
35.	Political Science	56.5	35.	Biology	46.5

B. Master's and Doctoral Graduates

As one would expect, the proportion of master's and doctoral graduates in non-HQM occupations was much lower than for bachelor's graduates. In 1978, 26 per cent of recent bachelor's graduates were in non-HQM jobs, compared with 15 per cent of master's graduates and 12 per cent of doctoral graduates. Furthermore, employment in these jobs increased more during the 1970s for bachelor's than for master's and doctoral graduates. The proportion of graduates in non-HQM jobs increased 5 percentage points (from 21 per cent to 26 per cent) for bachelor's, 3 percentage points at the doctoral level (from 9 per cent to 12 per cent), and not at all at the master's level (constant at 15 per cent) (see Table 7).

Table 7. Graduates in Non-Highly Qualified Manpower Occupations Two Years after Graduation, by Degree Type and Field of Study, 1971 and 1978

Field of Study	<u>Bachelor's</u>		<u>Master's</u>		<u>Doctoral</u>	
	1971	1978	1971	1978	1971	1978
	--- Per cent distribution ---					
All Graduates	21	26	15	15	9	12
Business	33	30	23	15	-	-
Education	6	13	6	5	18	2
Humanities	30	32	19	25	0	13
Social Sciences	26	31	16	17	7	5
Biological Sciences	27	46	9	30	16	25
Engineering	18	21	12	11	6	16
Health	3	8	16	12	0	16
Math and Physical Sciences	17	23	14	10	13	15

The biological sciences underwent the largest proportional increase in non-HQM jobs. At all three levels--bachelor's, master's and doctoral--the job market seemed to weaken most in this field during the 1970s. At the bachelor's level, employment of biology graduates in non-HQM jobs rose from 27 per cent to 46 per cent between 1971 and 1978, at the master's level from 9 per to 30 per cent, and at the doctoral level from 16 per cent to 25 per cent.

It must be noted that it could be reasonably argued that this particular classification of occupations into HQM and non-HQM categories results in measures that are either too low or too high. This could probably be said of any similar classification system. The emphasis in the interpretation, however, must be placed on the relative values of the proportion in non-HQM jobs as between fields of study and over time, rather than on the absolute values.

Summary

Emerging from this section are a number of general observations.

1. Teaching was by far the most prominent occupation of employment for graduates at all three levels, but it was even more important for bachelor's and doctoral graduates than it was for master's degree graduates.
2. While the overall proportion of graduates entering teaching occupations declined at the bachelor's level, the change was not as great as expected because of the requirement in some provinces in the early 1970s that elementary teachers have degrees.
3. There was a considerable decline during the 1970s in the proportion of master's and doctoral graduates entering teaching.
4. There continued to be a major difference in the types of occupations entered by male and female bachelor's graduates, with more women in teaching, clerical, social science, and health occupations, more men in engineering/math/science and management or management support occupations.
5. Some fields of study displayed a very strong connection to particular occupations while graduates from other fields entered a wide range of occupations. At the bachelor's level, 90 per cent of the graduates in professional fields entered related occupations, but biological science graduates showed little (and decreasing) concentration in a single occupation (the largest being 22 per cent in teaching).
6. The degree of change between 1971 and 1978 in the type of occupation obtained by graduates was, in general, least among bachelor's graduates and greatest among master's graduates. At the bachelor's level, education and business graduates found little change between 1971 and 1978 in the types of jobs they entered; graduates in the social and the biological sciences experienced the most change.

7. The labour market for education graduates remained surprisingly strong in the late 1970s, as they obtained related jobs and salaries at or above the average for bachelor degree graduates. But this could have been because of higher requirements at the elementary level during the early and mid-1970 and may not hold true today.
8. The labour market appeared to become weakest during the 1970s for graduates in the biological sciences at all three levels.
9. As expected with the rapid increase in the number of graduates during the 1970s, the proportion of bachelor's graduates in occupations not requiring a postsecondary education rose from 21 per cent to 26 per cent, but for master's graduates remained constant at 15 per cent and for doctoral graduates rose only 3 percentage points from 9 per cent to 12 per cent.

Section II INDUSTRIES GRADUATES ENTERED

In examining the relationship between education and employment, the latter is typically characterized by occupation and income. Another important, though often overlooked, aspect of employment is the industrial sector in which graduates from particular disciplines are likely to find jobs. For example, is there a tendency for graduates in, say, the humanities to locate work in the public or private sector?

Aside from the obvious interest to students planning careers, such information can be important for other reasons. For example, if graduates of some disciplines are highly concentrated in a particular economic sector, their employment prospects are closely tied to the economic health of that sector alone. Graduates from fields that are utilized throughout the economy can more easily locate employment in an alternative sector if part of the economy is experiencing slow growth.

Unfortunately, the information provided here cannot indicate with accuracy the likelihood of current or future graduates locating employment in particular industries. Changing economic conditions make such predictions impossible when based only on historical data. This section can, however, provide some evidence of the stability over time of the relationship between field of study and industry.

The following general questions are addressed in this section:

1. Which industries hired the most graduates and did this change between 1971 and 1978?
2. What was the relationship between field of study and industry entered by graduates?
3. Which of the two major sectors of the economy--public and commercial--hired the majority of university graduates?
4. How does this compare with findings in the United States?
5. What was the relationship between field of study and the two major sectors entered by graduates?
6. How did the two major sectors--public and commercial--utilize bachelor's degree graduates--that is, to what extent did these sectors employ graduates in jobs requiring degrees?

1. Employment by Industry

A. Bachelor's Graduates

The education industry¹⁷ employed far more bachelor's graduates in the 1970s than any other industry. Approximately one half of graduates were working in the education industry in 1971 and 41 per cent of graduates in 1978 (Chart 7).

After education, the industries employing the largest number of bachelor's graduates were public administration, that is, government (7 per cent of graduates in 1971 and 12 per cent in 1978), services to business management¹⁸ (8 per cent in 1971 and 9 per cent in 1978), and the health and welfare industry (7 per cent in 1971, 8 per cent in 1978). Other industries that employed a significant proportion (5 to 7 per cent) of bachelor's graduates were manufacturing, finance/insurance/real estate, and trade (Chart 7).

Many more bachelor's graduates found employment in service industries than in goods producing industries.¹⁹ Approximately 88 per cent of bachelor's graduates were employed in the service sector in both 1971 and 1978. In the labour force as a whole, 66 per cent of all workers were employed in the service sector in 1978.

In Chart 8, the hiring trends of individual industries may be observed. The number of bachelor's graduates hired per 10,000 employees in an industry was calculated to provide a rough measure of the rate at which different industries employed these graduates.

¹⁷ The term "industry", although not strictly appropriate when referring to service sectors such as education, is used simply to facilitate the reference to these services as employers in the overall economic structure.

¹⁸ This includes engineering and management consultants, accounting and architecture firms, law firms, etc.

¹⁹ Service industries include transportation/communications, trade, finance/insurance/real estate, community/personal/business services, and public administration. Goods producing industries are basically the primary and manufacturing industries.

Chart — 7

Employment by Industry of Bachelor's Graduates Two Years After Graduation, 1971 and 1978

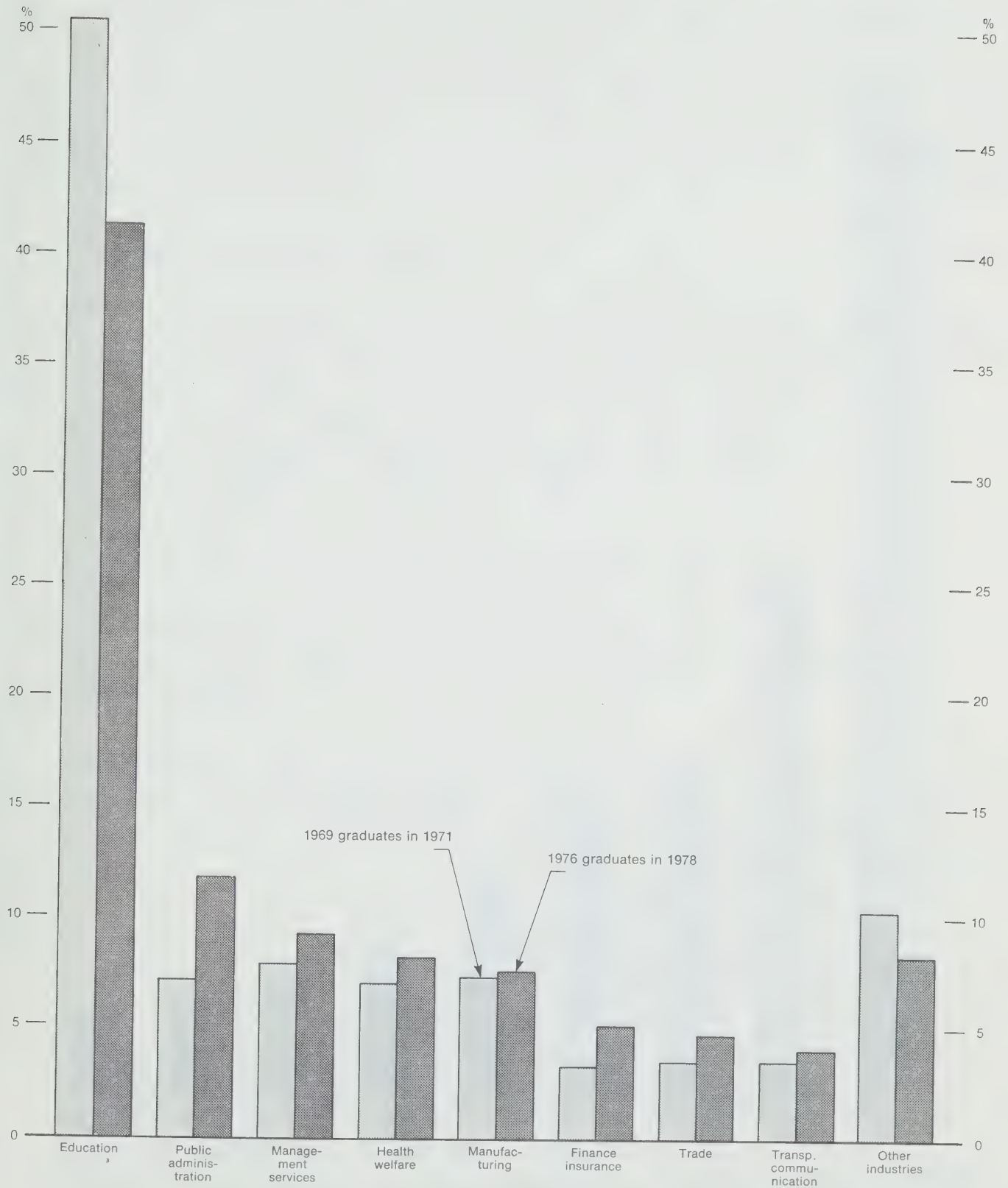
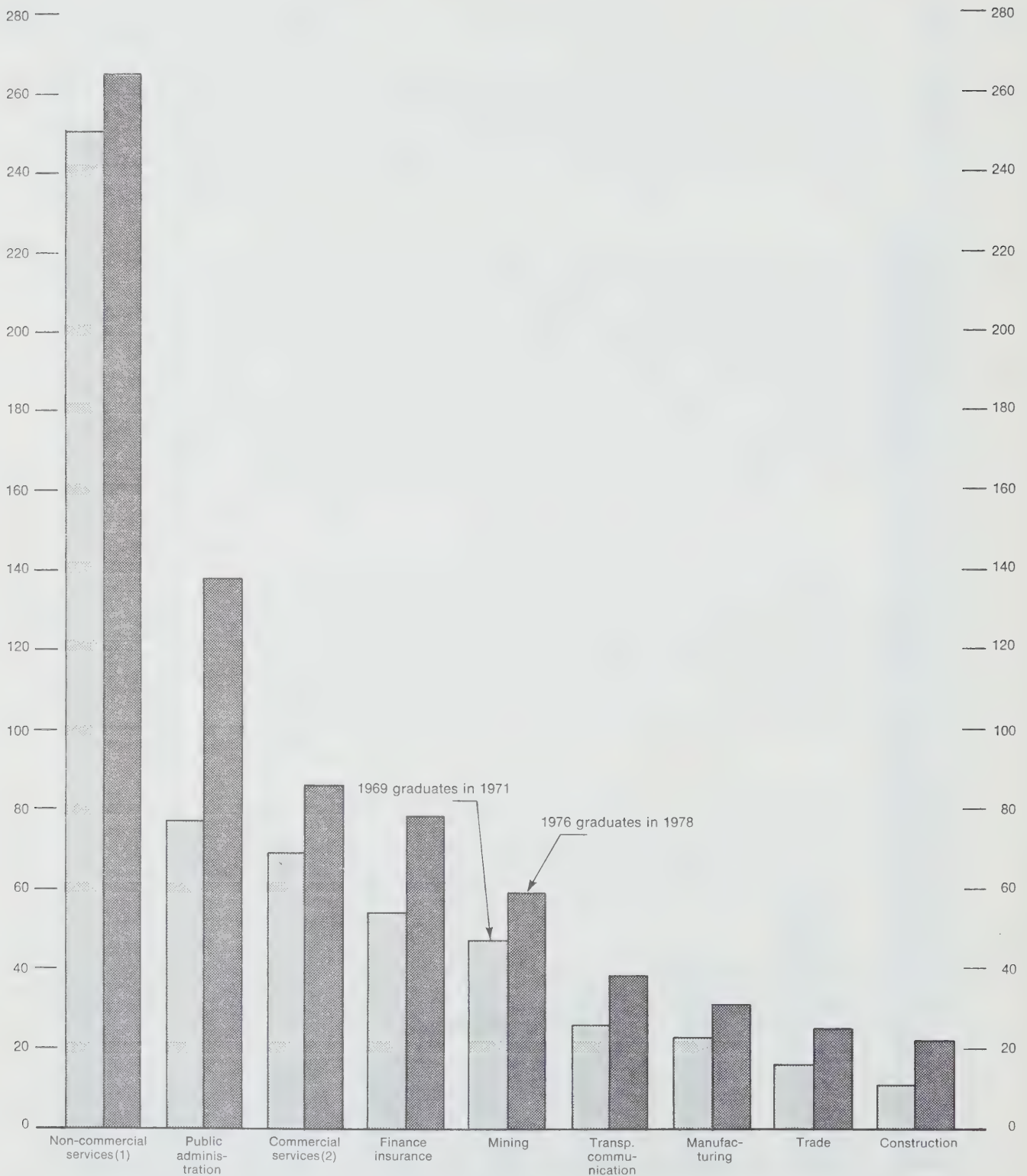


Chart — 8

**Number of Bachelor's Degree Graduates Entering an Industry
per 10,000 Employees, 1971 and 1978**



(1) Education, health and welfare, religion.

(2) Services to business managements, amusement and recreation services, personal services, accommodation and food services.

A rapid increase in the number of graduates between 1969 and 1976 led to an overall increase in their employment in the labour force: from 72 per 10,000 in 1971 to 89 in 1978. This increase was evident in all industries. The most striking feature in this chart, however, is the wide variation in the rate of hiring of graduates in different industries. In 1978 the number of graduates hired per 10,000 varied from as many as 265 in education, health and welfare and 138 in public administration, to as few as 20 and 25 in the trade and construction industries.

B. Master's and Doctoral Graduates

The pattern of employment by industry for master's and doctoral graduates was similar to that for bachelor's graduates. Chart 9 shows that the education industry employed by far the largest proportion of these graduates, although this fell between 1971 and 1978. One half of master's graduates entered the education industry in 1971; in 1978, this had fallen to 44 per cent.

Two-thirds of doctoral graduates found employment in the education industry in 1971. By 1978, this number had fallen to 57 per cent, as opportunities in the sector decreased. At both the master's and doctoral levels, the two next most important industries of employment were public administration and health and welfare.

Other industries employed a very small number of master's and doctoral graduates. Manufacturing, for example, employed 8 per cent of master's graduates and 6 per cent of the doctoral graduates in 1978 (see Tables 9 and 10).

As with bachelor's graduates, the majority of master's and doctoral graduates found employment in the service sector. In 1978, 90 per cent of master's graduates and 92 per cent of doctoral graduates were in service industries as compared to 66 per cent of the labour force as a whole.

Again, to show the rate at which various industries employed master's and doctoral graduates, the number of graduates employed (this time per 100,000 employees in the industry) was computed (Table 11). As expected, there was

Chart — 9

Employment by Industry of Master's and Doctoral Graduates Two Years after Graduation, 1971 and 1978

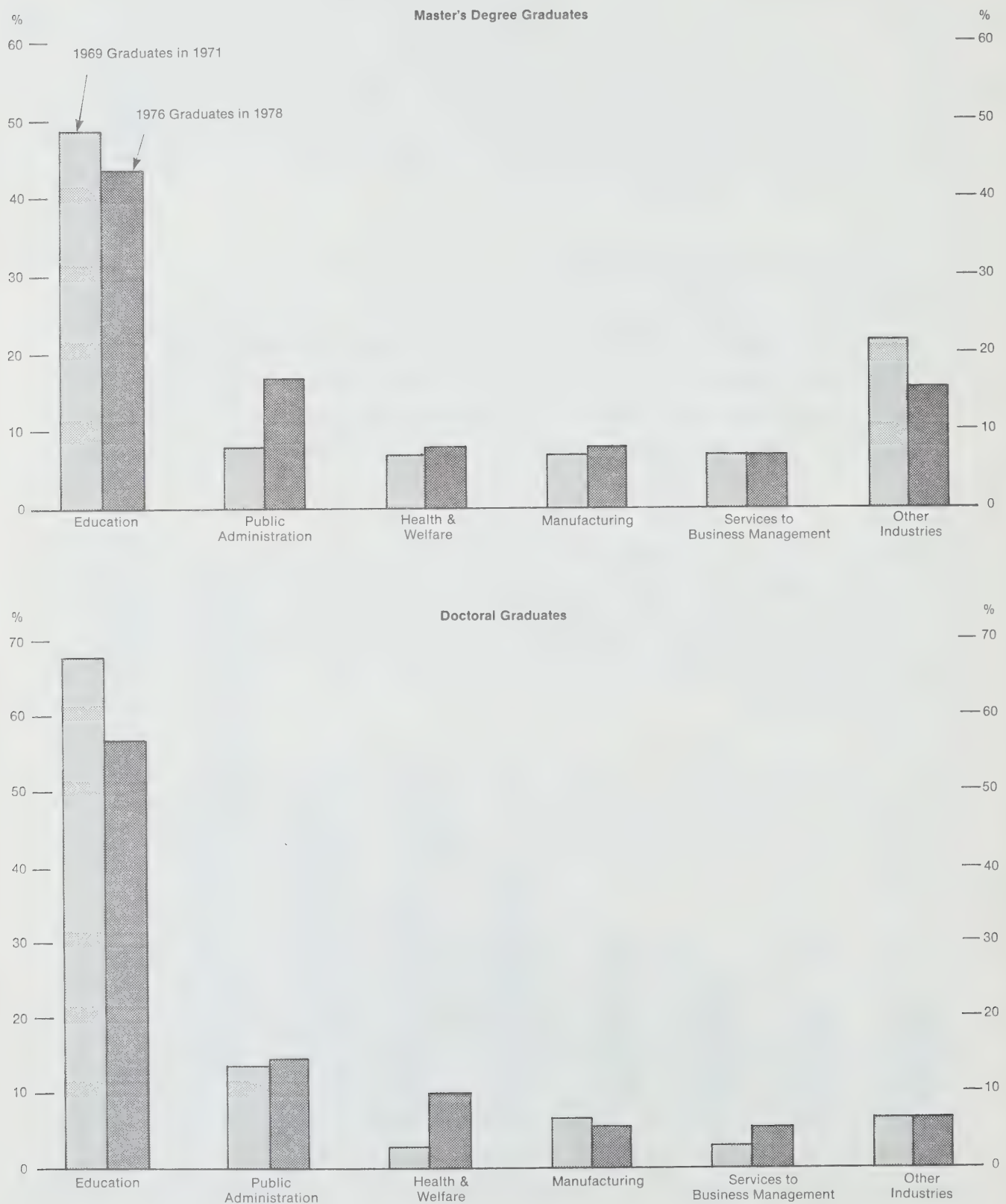


Table 8. Employment by Industry of Bachelor's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978

Field of Study	Year	Number	Education		Health/ Welfare		Service to Bus. Mgmt.		Other Comm. & Pers. Serv.		Public Admin.	Manufact. Insurance	Trade	Transp/ Commun.	Other Indust.
			-----Per cent distribution-----												
Business/ Commerce	1971	2,101	5.0	---	---	30.6	---	---	12.3	16.8	9.9	6.5	5.8	9.4	
	1978	3,623	8.0	---	---	30.4	3.9	---	11.7	13.0	14.4	8.3	5.1	3.9	
Education	1971	7,976	92.3	---	---	---	---	---	1.9	---	---	---	---	2.1	
	1978	10,298	82.5	1.3	0.9	2.8	---	---	5.0	2.5	1.5	1.1	1.2	1.2	
Fine Arts	1971	518	70.4	---	---	---	---	---	---	---	---	---	---	---	
	1978	1,608	46.6	---	4.3	---	14.4	---	10.9	6.0	3.5	7.1	3.1	3.4	
Humanities	1971	7,132	60.5	3.1	3.9	---	6.1	8.2	5.0	1.8	3.7	3.3	4.4	---	
	1978	7,799	52.1	2.5	3.1	---	7.1	10.2	7.9	4.7	5.4	3.9	3.3	---	
Soc. Sci.	1971	7,746	37.4	8.7	16.3	---	2.9	8.1	4.7	6.7	2.9	1.9	10.4	---	
	1978	12,916	33.6	8.4	13.5	---	4.6	16.1	6.1	6.4	4.6	3.6	3.1	---	
Bio. Sci./ Agric.	1971	2,046	45.9	9.6	---	---	---	10.3	9.4	---	---	---	13.5	---	
	1978	3,826	26.0	10.9	5.4	---	3.3	18.4	10.2	3.8	7.3	4.0	10.7	---	
Engn./ Appl. Sci.	1971	2,609	6.4	---	13.1	---	---	10.3	28.0	---	---	---	17.2	18.7	
	1978	2,704	5.0	---	21.0	---	---	12.8	23.4	---	---	---	16.9	14.9	
Health	1971	2,147	14.1	62.9	---	---	---	---	---	---	12.4	---	---	5.7	
	1978	2,784	4.3	70.0	---	---	---	10.4	---	---	12.7	---	---	---	
Math/ Phys. Sci.	1971	2,979	42.1	---	9.3	---	---	8.5	13.1	7.4	4.6	4.9	9.3	---	
	1978	2,903	26.9	---	15.4	---	---	12.3	13.4	12.2	2.7	7.8	6.6	---	
General	1971	3,000	52.7	---	5.2	---	3.4	8.7	9.6	4.5	---	---	3.3	7.4	
	1978	594	39.3	8.9	---	---	---	16.9	---	---	7.2	---	---	---	
TOTAL (Can.) (nine prov.)	1971	38,254	50.4	6.9	7.8	---	2.6	7.1	7.2	3.4	3.5	3.5	7.6	---	
	1978	49,751	41.2	8.2	9.2	---	4.1	11.7	7.5	5.1	4.8	4.1	4.1	---	

---indicates the number was too small to be a statistically reliable estimate.

Table 9. Employment by Industry of Master's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978

Field of Study	Year	Number	Ed.	Health/ Welfare	Service to Bus. Mgmt	Other Comm./ Pers. Serv.	Public Admin.	Manufac- turing	Finan./ Insur.	Trade	Transp/ Commun.	Other Indust.
-----Per cent distribution-----												
Business/ Commerce	1971	664	9.4	—	15.2	—	6.8	21.6	19.3	5.8	9.1	8.5
	1978	1,046	11.9	1.9	15.9	2.0	13.4	25.4	12.2	5.0	8.8	3.5
Education	1971	927	85.4	2.2	—	3.1	4.6	—	—	—	—	3.7
	1978	1,350	87.1	2.5	—	2.1	4.2	—	—	—	—	0.8
Humanities	1971	844	79.1	—	—	9.7	5.8	—	—	—	—	—
	1978	942	59.2	3.0	4.5	9.6	10.5	2.5	3.3	4.3	—	—
Soc. Sci.	1971	1,008	32.4	21.2	5.5	5.3	11.7	—	2.8	—	—	17.6
	1978	1,365	25.2	23.9	4.6	2.5	32.6	2.8	3.8	1.8	—	2.0
Bio. Sci./ Agric.	1971	254	52.8	5.7	5.5	—	7.5	8.4	—	—	—	17.3
	1978	238	41.4	9.1	5.9	0.5	28.5	5.9	—	—	—	—
Engn./ App. Sci.	1971	610	19.2	—	21.5	—	10.6	19.1	—	2.3	9.9	13.4
	1978	458	13.1	—	22.3	—	25.6	19.6	—	—	12.5	5.4
Health	1971	89	27.3	67.0	—	—	—	—	—	—	—	—
	1978	123	39.9	39.0	—	—	—	—	—	—	—	—
Math/ Phys. Sci.	1971	415	54.2	—	5.6	—	13.5	6.3	—	—	—	11.4
	1978	392	43.5	—	8.6	—	13.1	9.9	6.4	—	10.5	5.5
TOTAL (Can.) (nine prov.)	1971	4,844	49.1	7.1	6.9	3.9	8.2	6.9	3.6	1.5	3.3	9.5
	1978	6,061	43.6	8.1	7.4	3.2	16.7	8.3	4.2	2.1	3.8	2.6

---indicates the number was too small to be a statistically reliable estimate.

Table 10. Employment by Industry of Doctoral Graduates Two Years after Graduation, by Field of Study, 1971 and 1978

Field of Study	Year	Number	Ed.	Health/ Welfare	Service to Bus. Mgmt	Public Admin.	Manufact. Insurance	Trade	Transp/ Commun.	Other Industries
----Per cent Distribution----										
Education	1971	70	83.6	5.0	---	6.4	---	---	---	---
	1978	70	78.5	11.0	---	---	---	---	---	---
Humanities	1971	101	95.5	---	---	---	---	---	---	---
	1978	117	86.5	---	---	6.3	---	---	---	---
Soc. Sci.	1971	151	63.5	5.2	2.8	14.6	---	---	---	13.9
	1978	261	56.3	15.6	7.0	17.4	---	---	---	---
Bio. Sci./ Agric.	1971	137	62.9	3.3	---	23.7	6.0	---	---	4.1
	1978	93	46.2	9.2	---	27.7	6.6	---	---	5.6
Engn./ App. Sci.	1971	110	44.6	---	14.6	9.5	26.3	---	5.1	---
	1978	98	26.7	---	17.0	15.0	17.0	---	11.1	---
Math/ Phys. Sci.	1971	127	65.4	---	---	21.5	7.3	---	---	---
	1978	185	50.0	---	---	18.4	10.3	---	---	---
TOTAL (Can.) (nine prov.)	1971	714	68.2	2.2	2.8	13.6	6.7	---	---	5.3
	1978	896	57.3	9.8	5.8	14.9	5.6	---	2.5	2.2

---indicates the number was too small to be a statistically reliable estimate.

Table 11. Master's and Doctoral Graduates Hired per 100,000 Employees Two Years after Graduation, by Industry, 1971 and 1978

Industry	Master's		Doctoral	
	1971	1978	1971	1978
Mining	46	26	3	7
Manufacturing	20	28	3	3
Construction	6	13	0	0
Transportation/communication	23	29	1	3
Trade	6	9	0	1
Finance, insurance, real estate	56	52	0	1
Service sector:				
Commercial services	73	57	5	5
Non-commercial services	225	223	42	43
Public administration	84	160	20	21

a wide variation among industries. For master's graduates, it varied in 1978 from highs of 223 in the non-commercial services (education, health and welfare) and 160 in public administration to lows of 13 and 9 respectively in the construction and trade industries. Only the education, health and welfare, and public administration industries employed a significant number of doctoral graduates per 100,000 employees.

2. Relationship between Field of Study and Industry

The relationship between field of study and industry was examined in two ways: by principal industry of employment and by degree of concentration of graduates in one or a few industries.

(i) Principal Industry

Tables 8 to 10 showed the industries in which graduates from various fields of study found work in 1971 and 1978.

Chart 10 shows the principal industry of employment for bachelor's graduates in eight major fields of study--that is, the industry in which a majority of graduates from a given field of study were employed.

Generally, there was not a significant difference between 1971 and 1978 in the principal industry of employment for bachelor's graduates from various fields. The obvious exceptions, however, were biological science and math/physical sciences, where there was a significant decrease in employment in education.

As may be observed from Chart 10, there was a wide variation in the proportion of graduates from the various fields of study employed in the principal industry. For example, over 80 per cent of education graduates, not surprisingly, were employed in the education industry. Conversely, engineering and math/physical science graduates were employed in a wide range of industries.

In Table 12, the principal industry of employment is given for 32 fields of study.

Between 1971 and 1978, there was a statistically significant change in the proportion of graduates employed in the principal industry for only 13 of the 32 fields. The majority of these cases involved the education industry, where employment fell.

Chart — 10 (1 of 2)

**Employment of Bachelor's Graduates Two Years After Graduation,
by Field of Study and by Industry, 1971 and 1978**

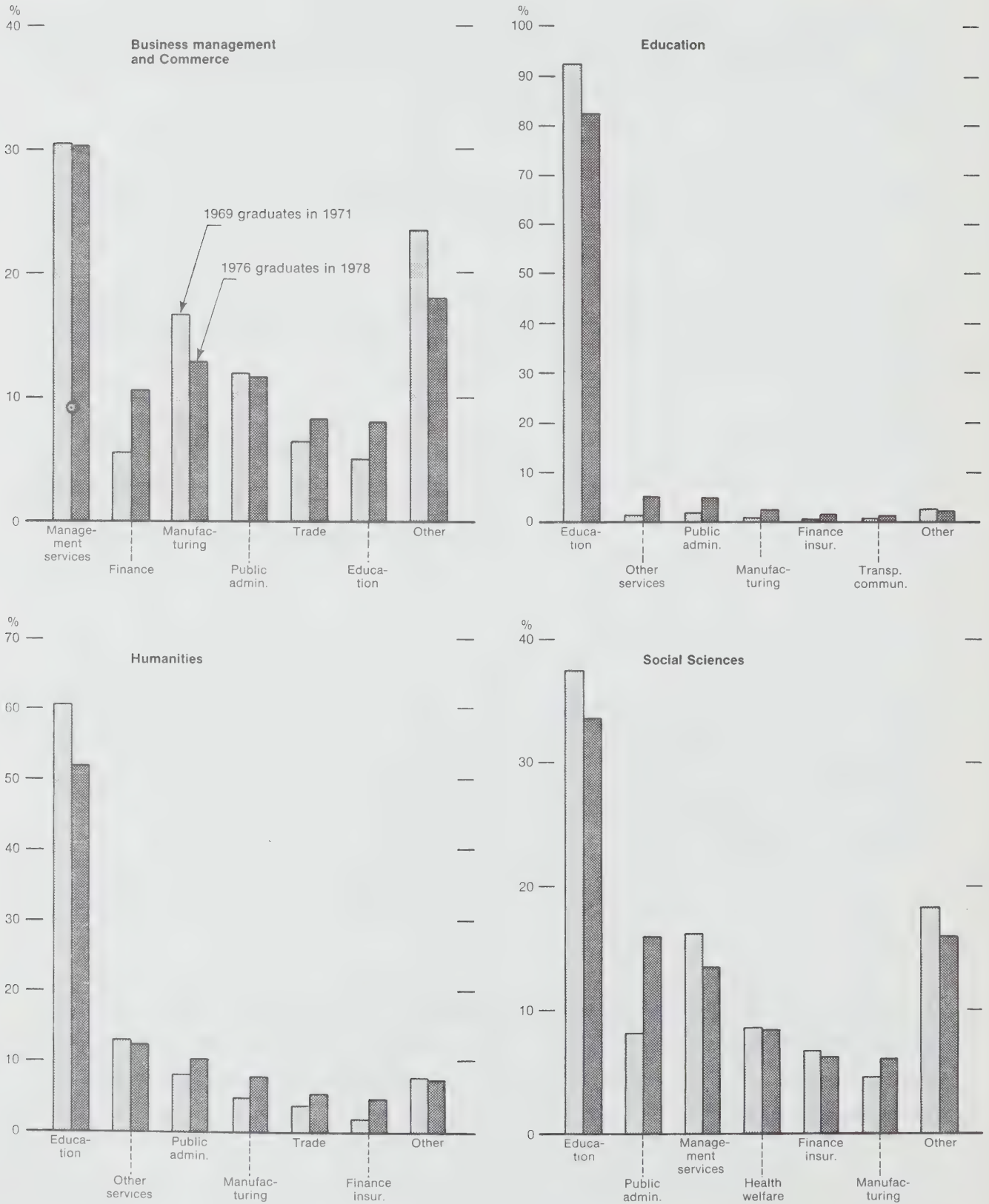


Chart — 10 (2 of 2)

**Employment of Bachelor's Graduates Two Years After Graduation,
by Field of Study and by Industry, 1971 and 1978**

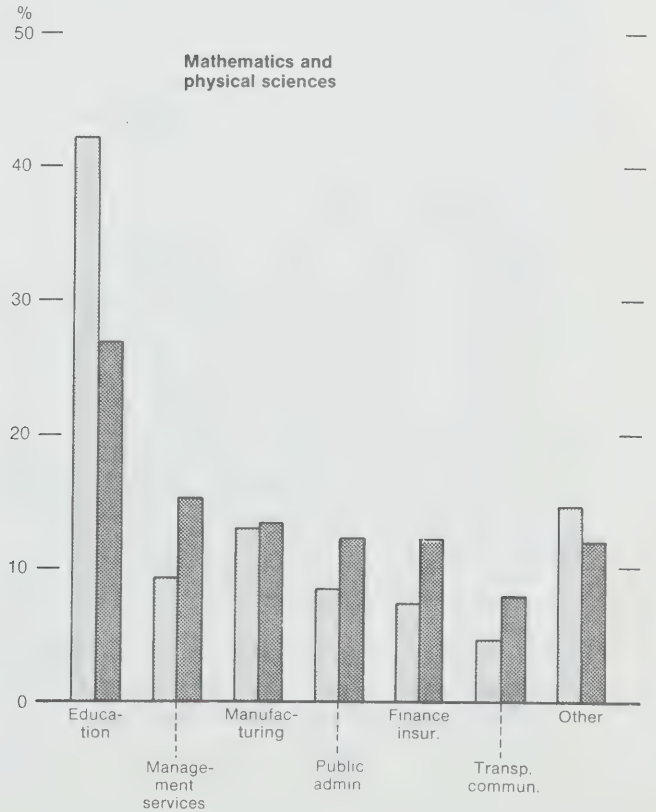
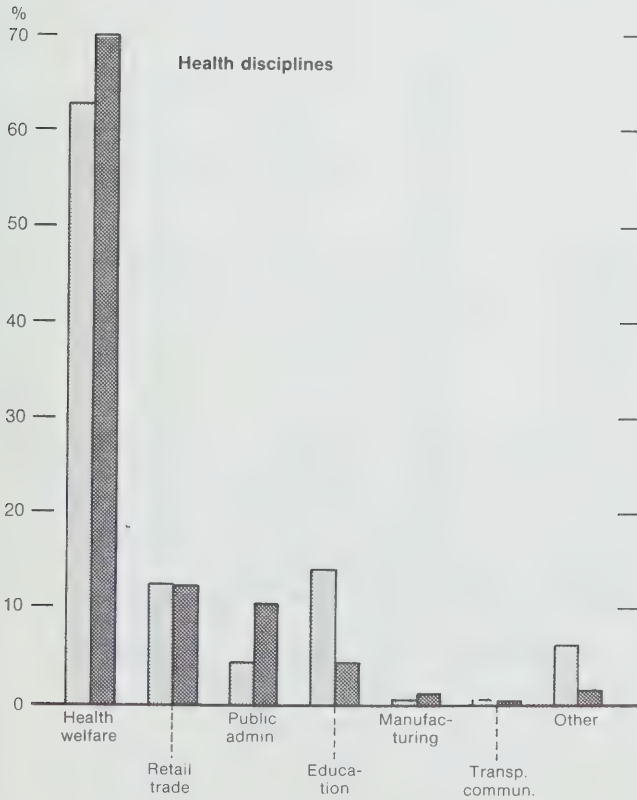
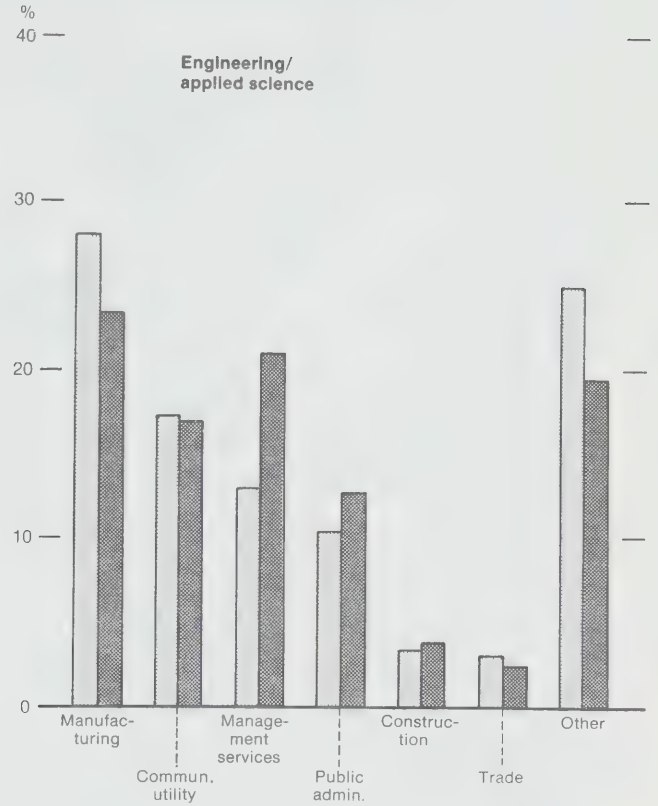
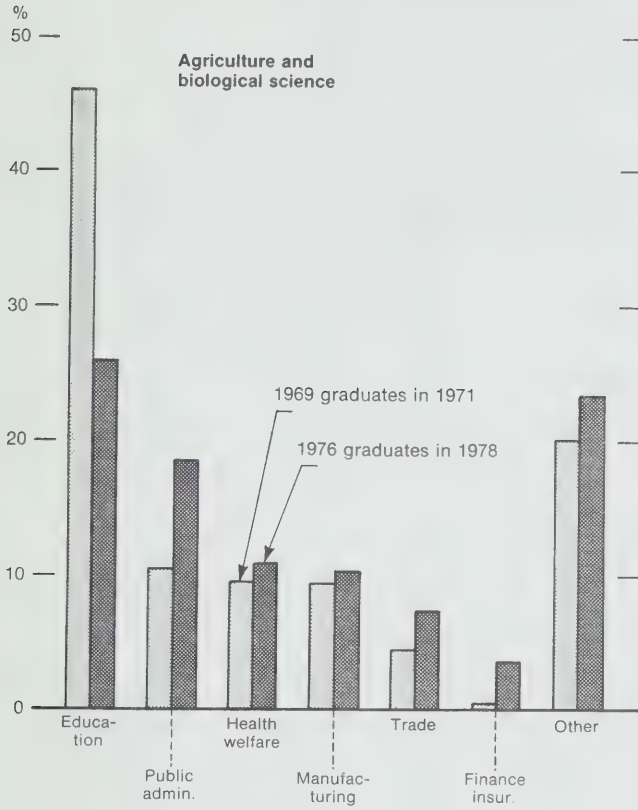


Table 12. Principal Industry of Employment and Index of Industrial Concentration for Bachelor's Graduates Two Years after Graduation by Field of Study, 1971 and 1978

	Field of Study	Principal Industry	Per cent in Principal Industry		Index of Industrial Concentration	
			1971	1978	1971	1978
	Dentistry	Health & welfare	88.1	95.3	.97	.97
H	Medicine	Health & welfare	86.4	91.2	.97	.96
I	Pharmacy	Health & welfare	74.6	77.0	.96	.95
G	Law	Management serv.	85.9	82.5	.96	.95
H	Nursing	Health & welfare	52.0	66.8	.96	.95
	Teacher education	Education	92.9	87.1	.97	.92
	French	Education	68.0	70.2	.93	.90
	Modern languages	Education	64.5	55.4	.94	.90
M	Religion	Religion	45.3	51.9	.94	.88
E	Physical education	Education	87.0 *	65.6	.97	.87
D	Philosophy	Education	45.9	40.8	.91	.86
I	Geography	Education	70.2 *	53.4	.94	.85
U	Household science	Education	60.0 *	36.8	.94	.85
M	English	Education	60.3	57.5	.88	.83
	Chemistry	Education	45.8	39.7	.87	.83
	No specialization	Education	52.7	39.3	.93	.83
	Sociology	Education	49.0	47.0	.88	.81
	Psychology	Education	48.6 *	42.8	.90	.81
	Fine Arts	Education	70.4 *	46.6	.92	.81
	Geology	Education	32.7 *	22.1	.90	.81
	Chemical/Engin.	Petroleum/coal	8.6 *	17.9	.72	.81
	Electrical/Engin.	Utilities	17.1	22.9	.79	.81
L	Math	Education	42.4 *	26.2	.86	.78
O	Forestry/Architec.	Management serv.	37.4 *	33.2	.91	.77
W	Civil engineering	Management serv.	25.7	25.5	.84	.78
	History	Education	59.5 *	45.5	.89	.77
	Misc. engineering	Management serv.	9.7	16.3	.74	.76
	Agric/Botany/Zool.	Education	35.3 *	25.7	.83	.76
	Mechanical/Engin.	Management serv.	8.7	19.2	.70	.74
	Business, commerce	Management serv.	30.6	30.4	.75	.71
	Political services	Education	39.6 *	34.3	.87	.71
	Biology	Education	48.1 *	30.1	.91	.71

* Indicates there was a statistically significant difference in the percentages for the two years; there was not a significant difference between all other percentages.

(ii) Degree of Concentration

The degree of concentration is measured here, as in Section I, by an index of industrial concentration (described in Appendix E). The highest possible value in the index is 1.0, which would be achieved if all graduates were employed in a single industry; the lowest value is 0, achieved if graduates were equally distributed across all industries used in the analysis.

A high value indicates a strong relationship between field of study and a particular industry (or a few industries). A low value indicates there was not such a strong relationship to one industry, and that graduates were dispersed among many industries.

The fields are listed in Table 12 in order of their dispersion among industries (that is, most concentrated fields to least concentrated) and a relative and somewhat arbitrary classification of high, medium, and low has been imposed on them.

The professional fields (excluding engineering) had the highest level of industrial concentration. From 66 per cent to 95 per cent of graduates were employed in the single industry in which their occupation was based. Engineering, architecture, math and computer science, the biological sciences, business and commerce, and some of the social sciences had a high degree of dispersion among industries (that is, a low index of concentration). In these fields, fewer than one third of the graduates were employed in a single industry.

Nevertheless, the degree of industrial concentration was quite high for most fields. While the highest value achieved was 0.97, the lowest value was 0.71.

In general, university graduates were more dispersed among industries in 1978 than in 1971. The index of industrial concentration fell from .81 to .75. This was largely due to the movement from public to commercial sector industries in response to decreasing opportunities in the public sector as discussed in the next section.

The concentration of graduates in particular industries fell more noticeably between 1971 and 1978 than did the concentration of graduates in particular occupations. Education is generally oriented more strongly toward a particular occupation than toward a particular industry. Thus, in time of tight labour markets, some graduates can locate employment in industries other than those traditionally entered (leading to decreased industrial concentration). It is more difficult for them to shift from the occupations they normally enter, and thus the concentration shows less change.

A greater dispersion of graduates from various fields (other than professional ones) among industries could be beneficial (assuming the jobs obtained in all industries are of more or less equivalent rank). If the graduates from a field of study depend largely on one industry for employment, they are much more vulnerable to an economic weakening in that particular sector of the economy than if they are employed in occupations over a wide range of industries.

3. The Public and Commercial Sectors

The education, public administration, and health and welfare industries hired the majority of university graduates in the 1970s. These industries have one characteristic in common--they are all public industries of a non-commercial nature. In light of this fact, it is interesting to consider the employment of graduates in terms of the public non-commercial and the commercial sectors of the economy.

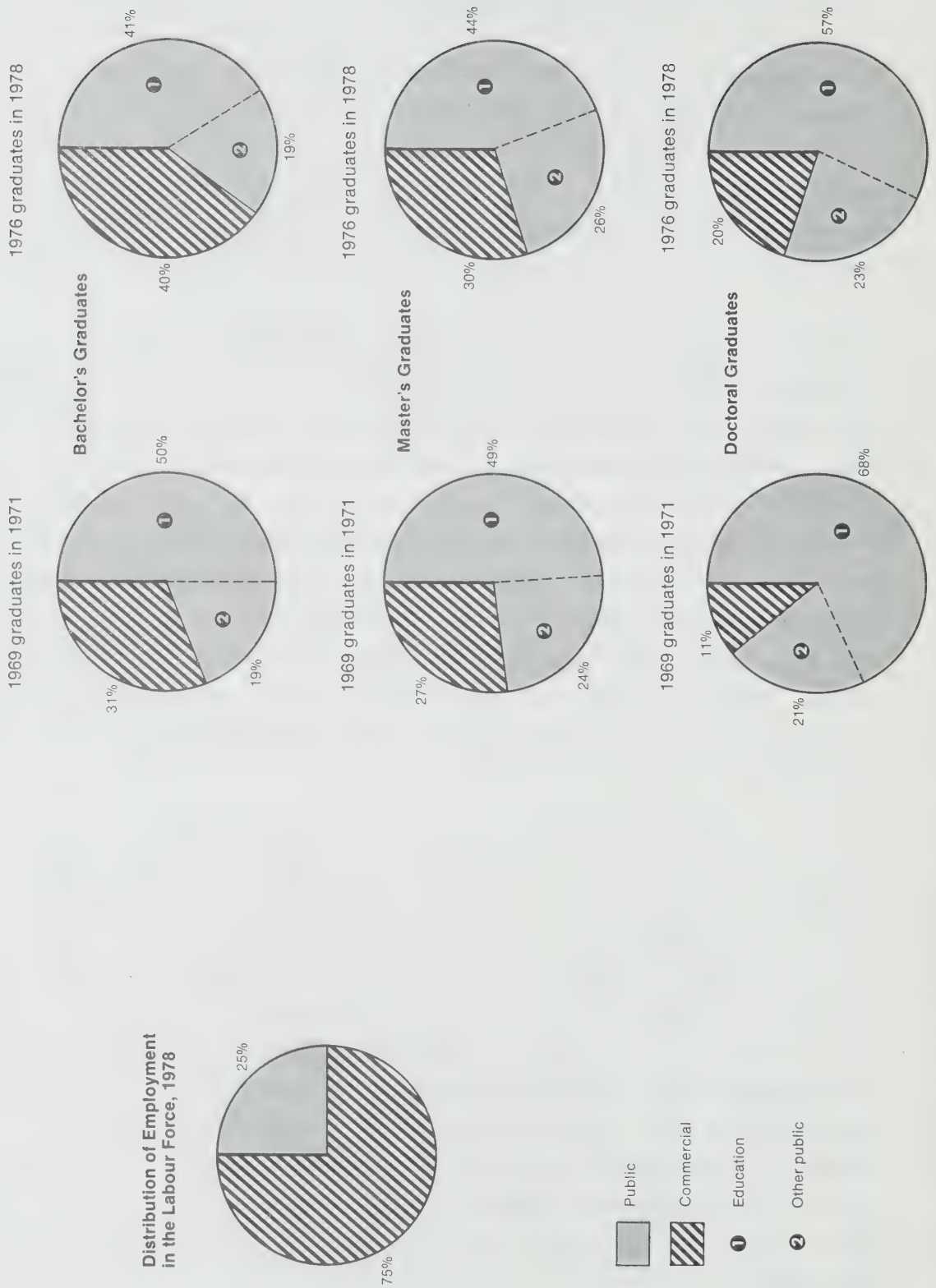
For the purposes of this study, the term **public sector** refers to the education, public administration, health and welfare, postal, and defence industries. It does not, however, include public enterprises, such as crown corporations, that have a commercial function.²⁰

The term **commercial sector** for this study comprises all other industries. This sector includes manufacturing, transportation, communication, utilities, finance/insurance/real estate, and all other commercial services including public enterprises of a commercial nature. The public sector as defined here basically consists of non-profit public services, and the commercial sector includes all profit-oriented industries, be they public or private.

Chart 11 shows both the proportion of the labour force in the public and commercial sectors in 1978 and the proportion of 1969 and 1976 graduates employed in these sectors in 1971 and 1978 respectively. The extent to which the public sector employed university graduates is very apparent: although it employed only one-quarter of the total work force, in 1978 this sector employed 60 per cent of bachelor's graduates, 70 per cent of master's graduates and 80 per cent of doctoral graduates two years after graduation. Nevertheless, this represented a decline from 1971 when 69 per cent of bachelor's graduates, 73 per cent of master's graduates, and 89 per cent of doctoral graduates were employed in the public sector. In all cases, as pointed out earlier, the education industry employed the majority of graduates.

²⁰ The standard industrial classification (SIC) codes for the industries included in the public non-commercial sector are given in Appendix C.

The Employment of University Graduates in the Public and Commercial Sectors Two Years after Graduation, 1971 and 1978



Two observations can be made here. First, the proportion of graduates employed in the public sector declined at all levels between 1971 to 1978. This was no doubt largely due to the decreasing opportunities in teaching with the decline in elementary school enrolment and the levelling off of secondary school enrolment in the 1970s.

Second, the higher the level of education, the larger the proportion of recent graduates employed in the public sector. Doctoral graduates were more likely to be employed in the public sector than master's graduates, master's graduates more likely than bachelor's graduates.

The rate at which the two sectors hired recent graduates was determined using the method described earlier of calculating the number of bachelor's graduates hired per 10,000 employees, and master's and doctoral graduates hired per 100,000 employees.

In 1971 the rate of hiring of bachelor's graduates was seven times greater in the public sector than in the commercial sector. By 1978, with opportunities for graduates decreasing in education and government, this rate had dropped to five times that of the rest of the economy.

The pattern was the same for master's and doctoral graduates. In 1978 the rate of hiring recent master's graduates in the public sector was seven times that of the rest of the economy. The rates for hiring doctoral graduates in 1978 displayed an even greater difference: twelve times more graduates were hired per 100,000 employees in the public than in the commercial sector.

As usual, such findings provoke further questions. What kinds of jobs did graduates get in the various sectors? To what extent were they hired in jobs requiring a university education? Were graduates of some fields utilized more than others in certain sectors?

Before questions such as these are addressed, a comparison is made with the United States to see how that country employed its graduates.

4. Comparison with American Graduates

American 1976-77 bachelor's degree graduates were surveyed in February 1978. A comparison of employment in the public non-commercial and commercial sectors as defined in this report²¹ is shown in Chart 12.

The commercial sector in the United States employed a much larger proportion of recent graduates than was the case in Canada. Approximately 57 per cent of recent American bachelor's graduates found employment in the commercial sector in 1978 compared to 40 per cent of recent Canadian graduates.

Chart 13 compares the proportion of recent bachelor's graduates employed in particular industries in the United States and Canada in 1978. In Canada the education and government sectors absorbed a larger proportion of all bachelor's graduates. In the U.S., manufacturing, trade, "other" commercial industries, and health and welfare provided employment to a larger proportion of graduates.

These differences could have been caused by numerous factors, such as the type of education received in the universities, the amount of research and development conducted in the commercial sector industries in the U.S. compared with Canada, the hiring practices of management in the commercial sector in the two countries, and the demand for teachers with degrees. Further research to determine the factors at work would seem to be worthwhile. It is again important to point out that subsequent data necessary to such studies are not available in Canada.

²¹ The Canadian definition of the public non-commercial sector was applied to the U.S. data even though some sectors of the American health and education systems are commercial.

Chart — 12

Bachelor's Graduates Employed in the Public and Commercial Sectors, Canada and the U.S.A., 1978

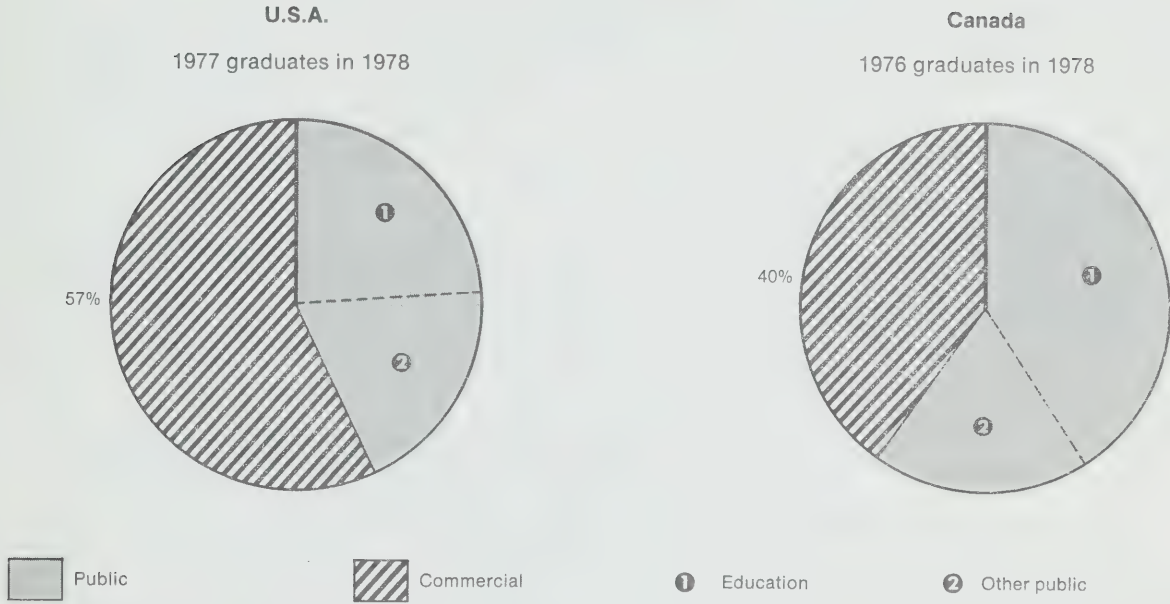
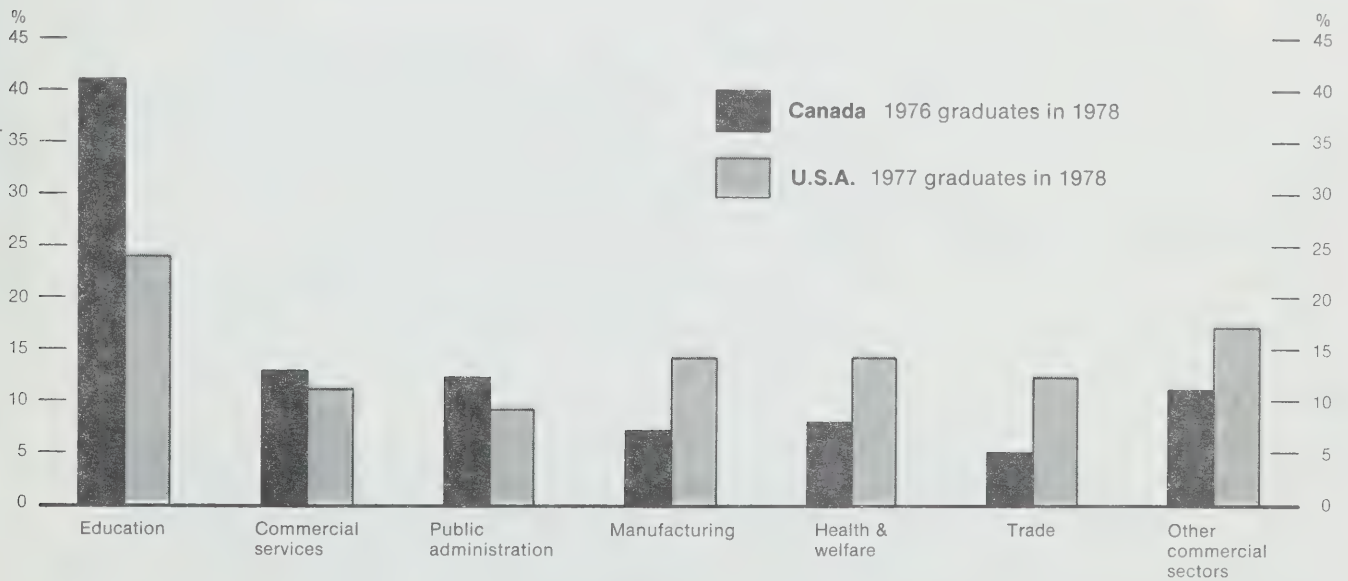


Chart — 13

Proportion of Bachelor's Graduates Entering Selected Industries, Canada and the U.S.A., 1978



5. Field of Study and the Public and Commercial Sectors

The data suggest that certain fields of study lead rather consistently to one of the two major sectors of employment. The purpose here is to attempt to outline such patterns of employment.

Fields of study have been classified according to the tendency of graduates to enter one of the two sectors. Those with more than 50 per cent of graduates entering the public sector have, for the sake of analysis and presentation, been called "public-sector oriented", and for the commercial sector, "commercial-sector oriented".²²

A. Bachelor's Graduates

Chart 14 shows that in 1978, fields for which more than 50 per cent of bachelor's graduates were employed in the public sector included education, humanities, agriculture and biological sciences, health, and social sciences (excluding law and economics).²³

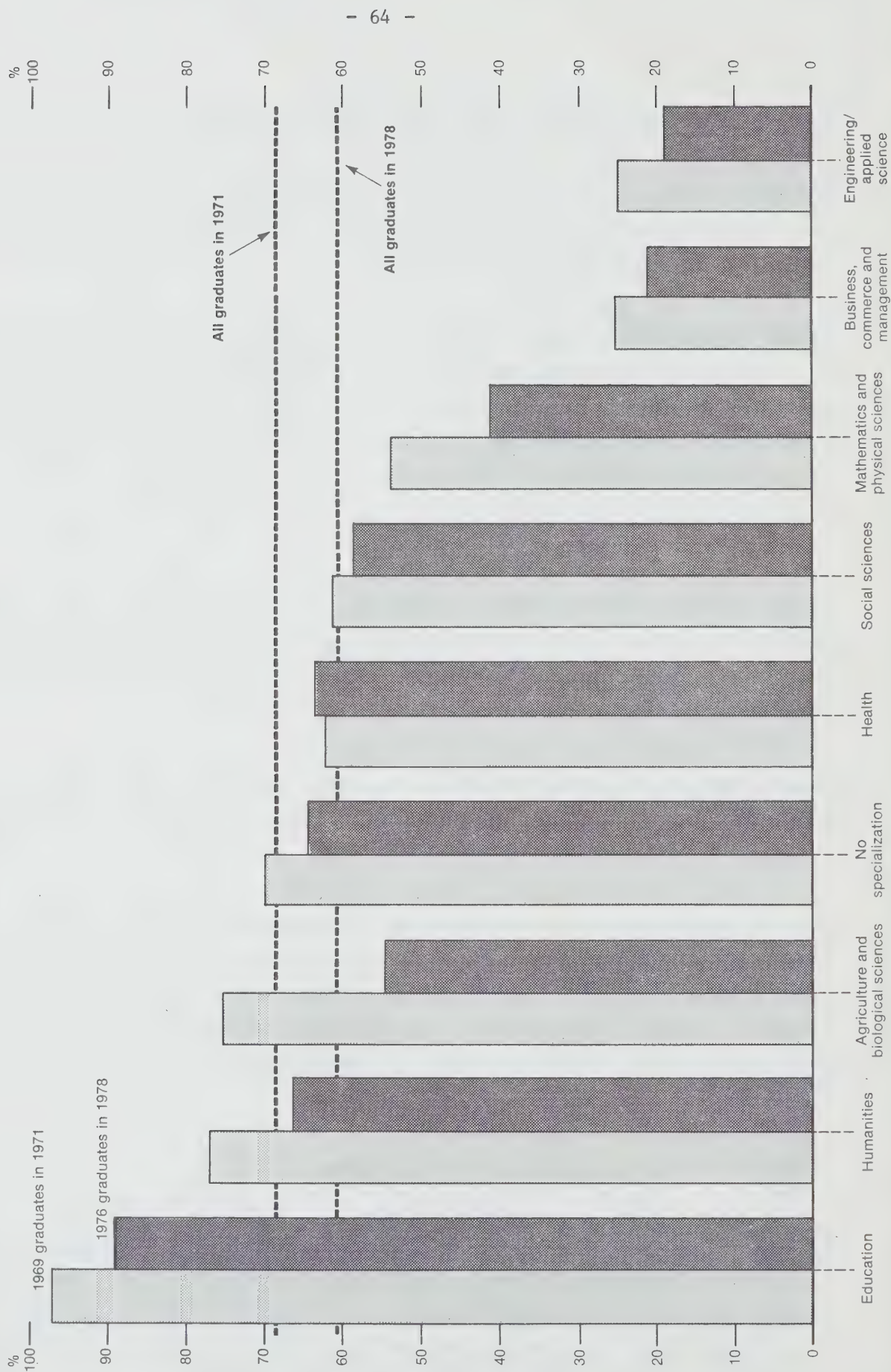
Those from which more than half of graduates found employment in the commercial sector included engineering, business, mathematics and physical sciences, as well as law and economics.

In 1978, three-quarters of all bachelor's graduates were from public-sector oriented fields. Seventy-four per cent of the graduates from these fields did in fact enter the public sector. Similarly, the commercial-sector oriented fields, representing approximately one-quarter of bachelor's graduates in 1978, had 74 per cent of their graduates enter the commercial sector.

²² These terms do not refer to the purpose of the education offered in these fields of study but rather to their reflection in the labour market.

²³ When more detailed fields of study are examined, it is observed that economics and law, while part of the social sciences, supplied more graduates to the commercial than to the public sector.

Percent of Bachelor's Graduates Employed in the Public Sector Two Years After Graduation, 1971 and 1978



A more detailed breakdown of fields of study of graduates employed in the public sector is given in Table 13.

The employment relationship just described between field of study and the two principal economic sectors generally holds true for both male and female graduates (Table 14). Overall, however, more women than men entered the public sector, primarily because more women entered teaching. Three-quarters of female bachelor's graduates were employed in the public sector in 1978 (54 per cent in education). For male graduates, approximately one half were in the public sector (29 per cent in education). There was a decline for both sexes in the proportion entering the public sector between 1971 and 1978. (For more information on the industries entered by male and female bachelor's graduates, see Appendix C.)

B. Master's and Doctoral Graduates

As noted earlier, the movement into the public sector was more pronounced at the higher levels of education (70 per cent of master's and 80 per cent of doctoral graduates found employment in the public sector in 1978). Chart 15 shows how important this sector was for master's graduates from particular fields. All fields except engineering and business sent more than half their graduates into the public sector. And at the doctoral level (Chart 16), virtually all fields of study except engineering looked mainly to the public sector for employment as from 80 to 95 per cent of graduates located public sector jobs.

Table 15 presents an overview of all graduates in the public sector.

Table 13. Bachelor's Graduates Employed in the Public Sector Two Years after Graduation, by Detailed Field of Study, 1971 and 1978

Field of Study	Number of graduates		Per cent in public sector	
	1971	1978	1971	1978
Business/Commerce	2,101	3,604	25.2	21.3
Physical Education	751	2,225	92.4*	78.7
Teacher Education	7,225	8,050	97.6*	92.0
Fine Arts	518	1,595	79.5*	59.1
English	2,051	2,794	75.3	67.5
French	1,185	1,236	78.1	78.9
Modern Lang.	361	332	72.4	82.0
History	2,214	2,126	78.3*	62.4
Philosophy	417	323	50.5	61.6
Religion	469	401	94.6*	76.9
Economics	1,389	1,486	46.3*	29.9
Geography	869	1,420	83.0	73.5
Law	1,054	1,493	9.1*	15.6
Political Science	628	1,291	63.6*	48.1
Psychology	2,243	3,316	77.9	71.8
Sociology	1,102	2,405	75.6	72.2
Other Social Sciences	428	996	63.5	67.2
Biology	626	1,674	82.0*	51.3
Household Science	557	810	90.4*	72.1
Agric/Misc.Bio. Sci.	863	1,317	61.6*	47.7
Chemical Engineering	342	245	12.3	5.9
Civil Engineering	503	612	33.4	27.1
Electrical Engineering	581	555	22.0	17.1
Mechanical Engineering	518	382	11.7	5.6
Other Engineering	461	359	37.3*	15.7
Forestry, Architecture	203	531	39.6	29.9
Dentistry	312	285	15.3*	4.1
Medicine	683	792	68.0	72.5
Nursing	726	943	96.8*	87.8
Pharmacy	356	421	21.6	17.0
Chemistry	685	394	62.2	54.8
Geology	151	351	42.5	43.3
Mathematics	1,671	1,857	50.5*	38.7
Physics	457	273	61.6*	33.7
No specialization	3,000	587	70.0	64.4
All Undergrads	38,253	49,582	68.5	60.4

* Indicates that there was a statistically significant difference in the percentages at the .05 level.

Table 14. Bachelor's Graduates Employed in the Public Sector Two Years after Graduation, by Major Field of Study and by Sex, 1971 and 1978

Field of Study	Sex	1971	1978
		----Per cent----	
All graduates	Both sexes	68.5	60.4
	Male	59.5	47.7
	Female	85.4	74.6
Business/Commerce	Both sexes	25.2	21.3
	Male	24.6	18.5
	Female	40.7	33.3
Education	Both sexes	97.1	89.1
	Male	95.7	86.0
	Female	98.9	91.1
Humanities	Both sexes	77.3	66.3
	Male	71.6	58.3
	Female	84.0	72.0
Social Sciences	Both sexes	61.2	58.7
	Male	56.0	46.7
	Female	72.9	72.0
Biological Sciences/Agric.	Both sexes	75.6	54.5
	Male	64.9	44.7
	Female	90.2	66.4
Engineering/Applied Science	Both sexes	25.0	19.0
	Male	25.1	19.3
	Female	15.9	15.4
Health Disciplines	Both sexes	62.3	63.6
	Male	39.7	42.6
	Female	83.9	76.3
Math/Physical Sciences	Both sexes	54.2	41.0
	Male	53.7	38.9
	Female	57.3	48.0
No Specialization	Both sexes	70.0	64.4
	Male	60.7	49.2
	Female	84.4	85.5

Chart — 15

Percent of Master's Graduates Employed in the Public Sector Two Years After Graduation, by Field of Study, 1971 and 1978

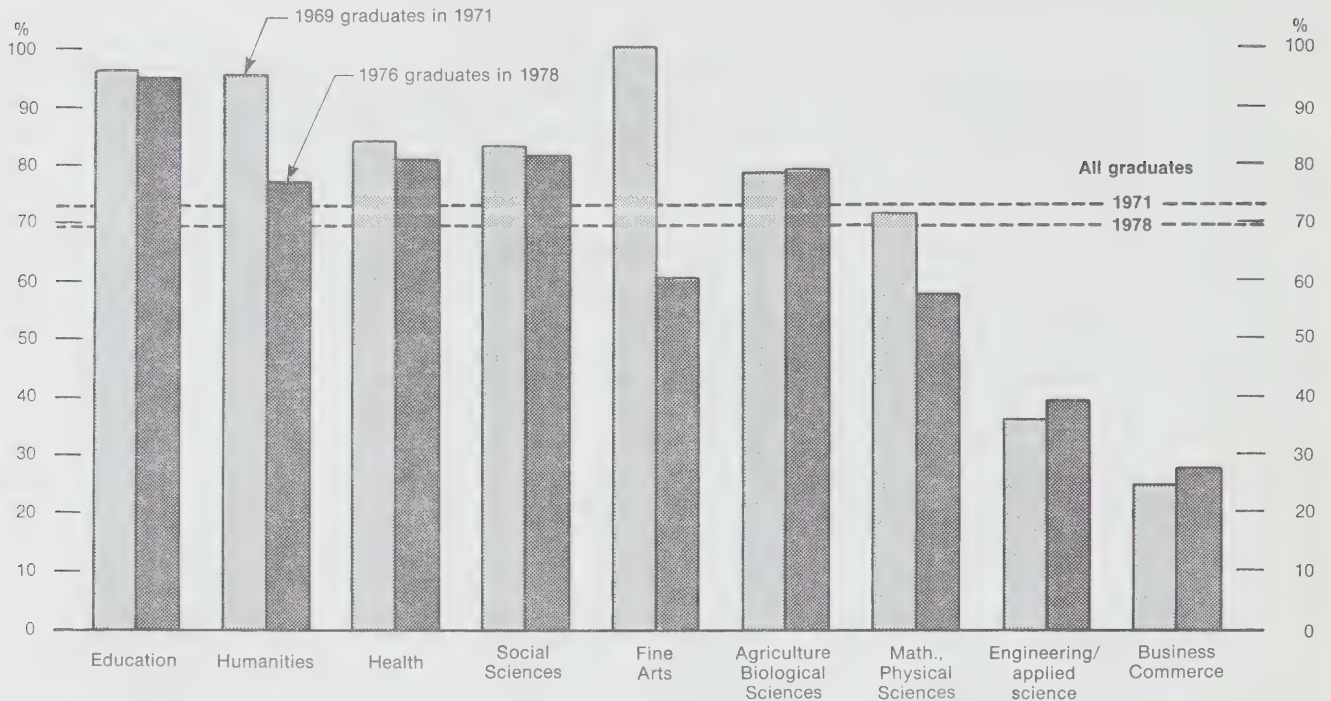


Chart — 16

Percent of Doctoral Graduates Employed in the Public Sector Two Years After Graduation, by Field of Study, 1971 and 1978

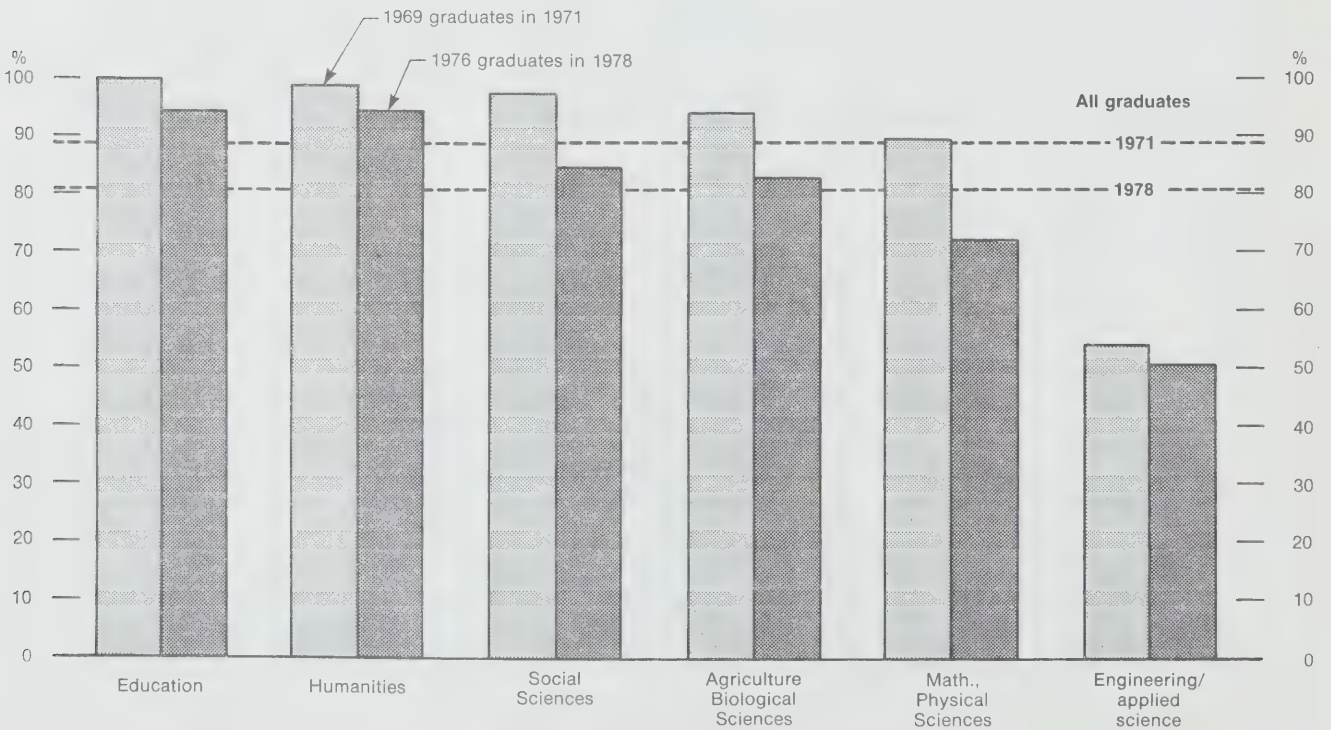


Table 15. Graduates Employed in the Public Sector Two Years after Graduation by Degree Type and Major Field, 1971 and 1978

Field of Study	Bachelor's		Master's		Doctoral	
	1971	1978	1971	1978	1971	1978
	-----Per cent-----					
Education	97	89	96	95	100	94
Humanities	77	66	96	77	99	94
Social Sciences	75*	70*	83	81	97	85
Health	62	64	84	81	--	--
Biological Sci.	76	55	79	79	94	83
Math/Phys. Sci.	54	41	72	58	90	72
Business/Commerce	25	21	25	28	--	--
Engn./App. Sci.	25	19	36	39	54	50
All Graduates	69	60	73	69	89	80

* Economics and law are excluded since their employment patterns were significantly different from those of other social science disciplines. The proportion employed in the public sector were: law - 9 per cent in 1971, 16 per cent in 1978; economics - 42 per cent in 1971, 30 per cent in 1978.

6. The Utilization of Graduates in the Public and Commercial Sectors

In Section I, the occupations of graduates were examined for their educational requirements using the classification developed by the Ministry of State for Science and Technology (MOSST). Under this classification, jobs are considered either highly qualified manpower occupations (HQM) or not highly qualified manpower occupations (non-HQM) according to the level of education required. HQM occupations require at least two years of postsecondary education; non-HQM occupations do not require such education.²⁴

Here the concern is with the utilization of graduates in the public and commercial sectors. Utilization was determined by calculating the proportion of graduates in the sector who found HQM jobs.

Table 16 shows the participation and utilization in 1978 of 1976 bachelor's graduates from eight major fields of study.²⁵ The level of participation is indicated by the proportion of the graduates employed in that sector, utilization by the proportion of those employees found in HQM jobs.

As already observed, bachelor's graduates from engineering, economics, business, mathematics, and the physical sciences tended to be hired more often in the commercial than the public sector, but no matter where they were employed, a large proportion obtained HQM jobs in 1978. Thus, utilization of the commercial-sector oriented group of fields was high (generally between .7 and .9) in both the commercial and public sectors.

The utilization rate for graduates from the public-sector oriented fields (education, humanities, social sciences, and biological sciences) was very high in the public sector (between .70 and .95), but very low in the

²⁴ For more information on the MOSST classification and for a listing of codes for occupations, see Appendix D.

²⁵ Graduates from the professional fields of medicine, law, pharmacy, and dentistry are excluded from this analysis.

Table 16. Participation and Utilization of 1976 Bachelor's Graduates in the Public and Commercial Sectors in 1978

Field of Study	COMMERCIAL SECTOR			PUBLIC SECTOR		
	Participation Proportion employed	Utilization Proportion of participants in HQM occns	Overall proportion in HQM Occns	Participation Proportion employed	Utilization Proportion of participants in HQM occns	Overall proportion in HQM Occns
Engn./App. Sci. Business/Commerce Economics Math/Phys. Sci. Subtotal Median Salary	.81 .79 .70 .59 .73	x x x x x \$15,600	.65 .53 .42 .41 .51	.19 .21 .30 .41 .27	x x x x x \$14,500	.15 .16 .24 .34 .22
Bio. Sci. Soc. Sci. ¹ Humanities Education Subtotal Median Salary	.45 .30 .35 .11 .27	x x x x x \$11,800 ²	.16 .10 .12 .03 .09	.55 .70 .65 .89 .73	x x x x x \$14,800 ²	.39 .57 .55 .85 .63
All Graduates ³	.38	x	.19	.62	x	.53

¹ excluding economics

² Part of the reason for the difference between these figures in the two sectors is that almost two-thirds of the graduates from these fields who were employed in the public sector were in teaching, which is a relatively high-paying HQM occupation. Teachers aside, the difference in salary and proportion in HQM occupations remains, but to a lesser degree (median salaries are \$11,800 in the commercial sector, \$12,900 in the public; proportion in HQM occupations is 34 per cent and 57 per cent respectively).

³ All professional fields of study are excluded from this table since they require education beyond a bachelor's degree.

Note:

All 1976 graduates employed in 1978 are included in these data. This is a somewhat heterogeneous group, including some mature graduates with work experience prior to entering university, some who obtained the degree part-time while still employed, and some who took further education between 1976 and 1978 (see Appendix B). This heterogeneity could affect the findings in the table. However, when a similar table was calculated using a homogeneous population of young graduates with no prior work experience and who had been full-time students, the salary participation and utilization differential between industrial sectors and fields of study remained basically the same.

Table 17. Participation and Utilization of 1969 Bachelor's Graduates in the Public and Commercial Sectors in 1971¹

Field of Study	COMMERCIAL SECTOR			PUBLIC SECTOR		
	Participation Proportion employed	Utilization Proportion of participants in HQM occns	Overall proportion in HQM Occns	Participation Proportion employed	Utilization Proportion of participants in HQM occns	Overall proportion in HQM Occns
Engn./App. Sci.	.75	x .80	= .60	.25	x .79	= .20
Business/Commerce	.74	x .64	= .47	.26	x .74	= .19
Economics	.58	x .61	= .35	.42	x .67	= .28
Math/Phys. Sci.	.46	x .66	= .30	.54	x .85	= .46
Subtotal	.63	x .70	= .44	.37	x .79	= .29
Median Salary		\$9,300			\$9,000	
No Specialization	.30	x .28	= .08	.70	x .80	= .56
Bio. Sci.	.24	x .43	= .10	.76	x .74	= .56
Social Sciences ²	.25	x .37	= .09	.75	x .81	= .61
Humanities	.22	x .19	= .04	.78	x .86	= .67
Education	.03	x .28	= .01	.97	x .96	= .93
Subtotal	.18	x .29 ³	= .05	.82	x .87 ³	= .71
Median Salary		\$8,100 ³			\$8,800 ³	
All Graduates ⁴	.29	x .52	= .15	.71	x .86	= .61

¹ The salary data here are from 1968 graduates in 1970 as salary data on 1969 graduates in 1971 were not available.

² excluding economics

³ part of the reason for the difference between these figures in the two sectors is that almost two-thirds of the graduates from these fields who were employed in the public sector were in teaching. Teachers aside, the difference in salary increases and proportion in HQM occupations remains, but to a lesser degree (median salaries are \$8,200 in the commercial sector, \$9,000 in the public; proportion in HQM occupations is 29 per cent and 61 per cent respectively).

⁴ All professional fields of study are excluded from this table since they require education beyond a bachelor's degree.

commercial sector (.24 to .36). Graduates from this group tended to be employed in the public sector and generally located HQM jobs in that sector. When employed in the commercial sector, only a small proportion were employed in HQM jobs.

The low rate of participation in the commercial sector by graduates in the public-sector oriented fields, together with their low utilization rate in that sector, would suggest that good job opportunities in the commercial sector were very limited for such graduates at least early in their careers. The proportion of graduates from these fields locating HQM jobs in the commercial sector two years after graduation varied from 3 per cent to 16 per cent, depending on the field of study. Yet three-quarters of all bachelor's graduates from our universities were enrolled in these fields in 1976.

Salary data tend to support these findings. Recent graduates in the public-sector oriented fields earned 25 per cent more in the public than in the commercial sector in 1978 (Table 16). Overall, graduates in the commercial-sector oriented fields earned approximately 8 per cent more in the commercial sector than in the public sector. The exception was business graduates, who earned 6 per cent more in the public sector than in the commercial sector (Table 18).

Table 17 shows that the same general patterns were evident in bachelor's graduates in 1971. The graduates of the various fields of study displayed a comparable degree of participation in the public and commercial sectors, although, as noted earlier, fewer overall were employed in the commercial sector than in 1978. The fields formed roughly the same two public-sector and commercial-sector oriented groups, although mathematics and physical science graduates located slightly more public than commercial sector jobs in 1971. Furthermore, graduates in the public-sector oriented group by and large found HQM employment in the public sector (87 per cent), but not in the commercial sector (29 per cent). Graduates in the commercial-sector oriented group did well in both sectors. There was not, however, as much variation in salaries among sectors in 1970 as in 1978. Overall, these observations are not unique to one period of time and may be indicative of a long-standing, perhaps continuing, pattern.

Table 18. Median Salary of 1968 and 1976 Bachelor's Graduates by Field of Study and by Industrial Sector, 1970 and 1978

Field of Study	<u>1970</u>			<u>1978</u>		
	Public	Commercial	Both	Public	Commercial	Both
Engn./Appl Sci.	\$9,200	\$9,600	\$9,500	\$16,500	\$17,750	\$17,500
Business, Commerce, Management	8,700	8,500	8,550	\$15,650	14,700	14,900
Math/Phys. Sci.	8,150	8,900	8,500	14,300	15,100	14,800
Education	9,500	8,350	9,450	15,000	12,000	14,800
Soc. Sci.*	8,700	8,000	8,500	15,000	11,350	13,900
Economics	8,600	8,500	8,550	14,300	13,900	14,000
Humanities	8,200	8,400	8,250	14,600	11,100	13,800
Agric./Bio. Sci.	8,000	8,250	8,050	13,300	13,100	13,400
General	8,450	8,000	8,300	13,700	12,900	13,400
All Graduates**	\$8,800	\$9,000	\$8,850	\$14,800	\$13,850	\$14,400

* excluding economics and law.

** excluding professional fields of study.

The participation and utilization of graduates can be made more meaningful through comparison. Table 19 (in the same manner as Tables 16 and 17) shows the participation and utilization of 1976-77 American bachelor's graduates in the public and commercial sectors in 1978. The definitions of the public and commercial sectors and of HQM and non-HQM jobs were identical in both the U.S. and Canadian data, although the surveys were taken at different times (the American survey approximately one year following graduation, the Canadian, two). As already noted, a larger proportion of U.S. graduates found employment in the commercial sector--57 per cent as compared to 40 per cent in Canada. Other major differences observed were:

1. A surprisingly large proportion of humanities graduates in the U.S. found employment in the commercial sector (71 per cent as compared to

Table 19. Participation and Utilization of 1977 U.S. Bachelor's Graduates in the Public and Commercial Sectors, 1978

Field of Study	COMMERCIAL SECTOR			PUBLIC SECTOR		
	Participation Proportion employed	Utilization Proportion of participants in HQM occns	Overall proportion in HQM occns	Participation Proportion employed	Utilization proportion of participants in HQM occns	Overall proportion in HQM occns
Engn./App. Sci.	.85	x .82	= .70	.15	x .66	= .10
Business/Commerce	.84	x .73	= .61	.16	x .70	= .11
Law/Economics	.80	x .62	= .50	.20	x .73	= .15
Humanities	.71	x .52	= .37	.29	x .60	= .17
Math/Phys. Sci.	.60	x .58	= .35	.40	x .84	= .34
Social Sciences*	.54	x .43	= .23	.46	x .55	= .25
Bio. Sciences	.50	x .36	= .18	.50	x .38	= .19
No Specialization	.43	x .33	= .14	.57	x .67	= .38
Education	.18	x .37	= .07	.82	x .91	= .75
Health/Medicine	.17	x .73	= .12	.83	x .86	= .71
All Graduates	.56	x .59	= .33	.44	x .71	= .31

* excluding law and economics

35 per cent in Canada), and the proportion of these locating HQM jobs, while low, was still higher than among Canadian graduates (52 per cent in U.S., 35 per cent in Canada).

2. Social sciences graduates (excluding economics and law) were also significantly more oriented towards the commercial sector in the U.S. where 54 per cent entered it, as compared to 30 per cent in Canada.
3. Overall, the proportion of bachelor's graduates employed in HQM occupations at the time of the survey was lower in the U.S. than in Canada--65 per cent in the U.S. and 74 per cent in Canada. However, it is possible this lower percentage was due, at least in part, to the shorter length of time between graduation and the survey date in the American study. Canadian graduates would have had more time to locate HQM employment.
4. Examined in terms of industrial sector, the study shows that the utilization of bachelor's graduates in the commercial sector (as measured by the proportion in HQM occupations) was higher in the U.S. than in Canada--59 per cent in the U.S., 50 per cent in Canada--but that in the public sector the utilization was higher in Canada--85 per cent as compared to 71 per cent in the U.S.
5. A larger proportion of American graduates located HQM jobs in the commercial sector (33 per cent as compared to 19 per cent in Canada), but fewer found HQM jobs in the public sector (31 per cent as compared to 53 per cent in Canada).

There are, of course, limitations to this rather simple exploratory comparison. As noted above, the graduates were surveyed two years after graduation in Canada and one year after graduation in the U.S. Graduates employed in non-HQM jobs, in the commercial sector in particular, may in time move into more responsible positions.²⁶

²⁶ Whether this occurs is not known. The importance of the first few years of work in establishing a career, however, is often stressed. It is possibly difficult for a person to move into an HQM job after having worked for a number of years in a non-HQM job, for example, as a clerk or a factory worker.

Many would also argue that it is not possible to identify categorically the occupations requiring a postsecondary education, particularly the type of education received in the public-sector oriented fields. Such education tends to be more general and is intended to develop a person's full intellectual potential and ability to adapt to new roles and circumstances. It is not necessarily intended to train that person for a particular occupation. One might argue that while some occupations, such as sales (other than technical sales jobs), do not require specific vocational training, other aspects of university education may be very important both in the selection of candidates and in the candidate's success in the job.

Notwithstanding this problem, the author believes the classification of HQM occupations used in this report is useful in that it provides a consistent measure of one aspect of employment patterns over two time periods and between two countries. In other words, this particular classification of occupations as HQM or non-HQM certainly leaves room for objections from both sides that the resulting estimate of persons in non-HQM jobs is too low or too high. This is probably true for any similar classification system. The major benefit of this approach is derived, however, not so much from the absolute values of the measure obtained, but more in the relative values, as among fields of study, economic sectors, countries, and over time.

It must also be stressed that the categorization of fields as public or commercial-sector oriented obviously does not imply that all graduates from a field necessarily locate employment in a given sector. The historical data indicate a tendency for graduates to migrate to one sector or the other. At the bachelor's level, the two broad fields for which this historical tendency is least clear are math and physical sciences and the biological sciences. These have tended to send closer to an equal number of graduates to each sector than other fields.

Overall, however, this method of analysis provides a rough measure of the strength of association -- through both participation and utilization -- between fields of study and sectors of the economy.

Section III PUBLIC SECTOR JOBS AND CHANGING GRADUATION PATTERNS

In this section, two main questions are addressed:

1. What happened to job opportunities in the public sector during the 1970s?
2. How did this affect university graduation patterns?

1. The Decline in Public Sector Growth

The vitality of the labour market for graduates, as for the labour force as a whole, depends on the economic climate. Since education and government have traditionally been the two largest employers of university graduates, it is interesting to review the growth of these industries during the 1970s.

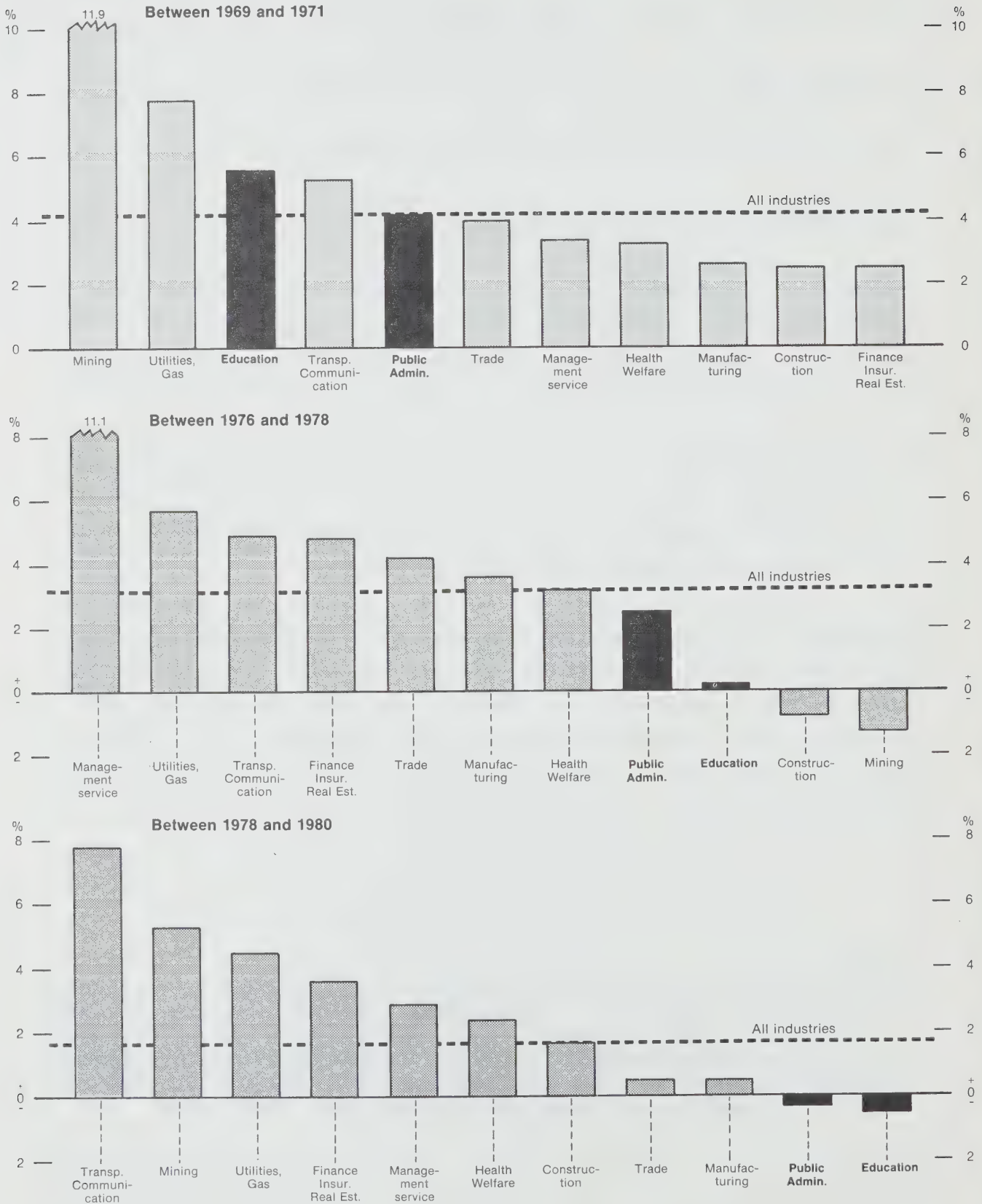
One measure of economic growth is the real domestic product (RDP)--the value of the goods and services produced by an industry.²⁷ Chart 17 shows the rate of growth of RDP in all major industries during three periods in the 1970s: 1969 to 1971, 1976 to 1978, and 1978 to 1980.

From 1969 to 1971, both education and public administration grew at or above the average rate of growth in the economy as a whole. By 1976 to 1978, growth in RDP in government had fallen to below the average RDP for all industries, and in the education sector growth was almost zero. By 1978 to 1980, both public administration and education were contracting, with RDP growth of approximately -.5 per cent annually.

²⁷ Real domestic product cannot be measured in the same way in the public and commercial sectors, since there is no "product" in the public sector to be marketed and assigned a price. The values for the public sector are basically expenditures. Thus, there is some difficulty in comparing the RDP for public and commercial industries. RDP can still, however, be used as an indication of changes in economic activity over time.

Chart — 17

Average Annual Increase in Real Domestic Product by Industry, Canada, Selected Years



Employment is another, perhaps more directly relevant, indicator of economic activity. In the public sector, employment growth displayed the same pattern as the RDP growth. In 1969 to 1971, the number of teachers, the major group in the education industry, was increasing at 3.4 per cent annually, and employment in government was rising by 4.5 per cent. By 1976 to 1978, however, the number of teachers was declining at an average of -0.3 per cent annually, and government employment had slowed to 2.0 per cent. By the end of the decade, the number of teachers was continuing to decline, and there was virtually no growth in government employment (0.1 per cent annual increase).

Given the continued low or declining levels of enrolment in the schools and government fiscal restraints, it is unlikely that public sector growth will increase, at least in the early 1980s.

Graduates from the public-sector oriented fields may therefore continue to encounter a weak labour market unless they can compete successfully for jobs in the commercial sector. At the time of writing, however, commercial sector growth has also been seriously curtailed by the recession that began in mid-1981. Thus, employment opportunities for graduates in the commercial-sector oriented fields are difficult to predict.

The sector, then, that according to this study provided the majority of jobs to graduates from the public-sector oriented fields of study (that is, in the mid-1970s, three-quarters of all bachelor's graduates and the majority of master's and doctoral graduates) showed a continuous decline in economic growth throughout the 1970s. This almost certainly affected employment opportunities for these graduates, and probably caused the shift in employment towards the economically stronger commercial sector.²⁸

²⁸ Overall, the average annual rate of growth in employment in the commercial sector was 1.9 per cent during the three years 1969, 1970, and 1971; 2.2 per cent from 1976 to 1978; and 2.9 per cent from 1978 to 1980. Employment data are not available for service to business management, which is the largest single employer of university graduates in the commercial sector; but economic growth as measured by the RDP was 3.2 per cent in 1969 to 1971; 11.1 per cent in 1976 to 1978; and 3 per cent in 1978 to 1980.

It may also explain in part why there was so much attention paid to "under-employment" among arts and science graduates in the 1970s.

These data prompt a number of questions. Is it in the best interests of either graduates or the economy that the relationships identified here between field of study and the public and commercial sectors continue? For example, does the commercial sector in Canada benefit as much as it could from the skills and knowledge imparted by the university, particularly at the master's and doctoral levels? Does the fact that a larger proportion of graduates in the U.S. enter the commercial sector mean that more highly qualified people are used throughout their industries?

The education received by arts and science graduates is, at least in part, intended to develop their full intellectual potential and to allow them to adapt to new roles and circumstances. It is argued by many, educators in particular, that while these qualities may not be the ones most immediately sought by employers--as compared to directly applicable skills--they may be qualities that serve the individual well through a lifetime of work and experience, and, in the long run, also serve their employers' interests. Perhaps the commercial sector should accept increased responsibility for training (and hence utilizing) more persons with general degrees. It would thus stand to benefit from the broader skills acquired by students through university education.

There is, however, another side to this argument. Given the low public sector growth, should the universities continue to use public funds to educate large numbers of graduates who are apparently more highly utilized in the public than in the commercial sector? And if it is in Canada's interest to build up its commercial sector, should more emphasis be placed on educating graduates in fields that commercial industries have traditionally utilized?

One must also ask, of course, whether the commercial sector needs more graduates in these fields. Some groups, such as the Task Force on

Employment Opportunities in the 1980s (Department of Employment and Immigration), are suggesting that a reallocation of resources in the postsecondary system is necessary. The Task Force advocates an expansion of engineering, technological training and selected business programs, and reduction in general arts and disciplines related to education and public administration. Furthermore, it suggests that "some reduction of the total commitment of resources to postsecondary training would be appropriate in order to free resources for other types of training".²⁹

2. Effect on Graduation Patterns

During the early 1970s, the supply of new graduates rapidly increased and job opportunities in the public sector, traditionally the most important sector of employment for graduates, decreased. In view of the low level of utilization in the commercial sector for graduates of public-sector oriented fields, it may be that the graduates from these fields would not find challenging and financially rewarding jobs in the commercial sector. The reaction of the students to their situation is examined here by using degrees granted statistics.³⁰

A. Bachelor's Graduates

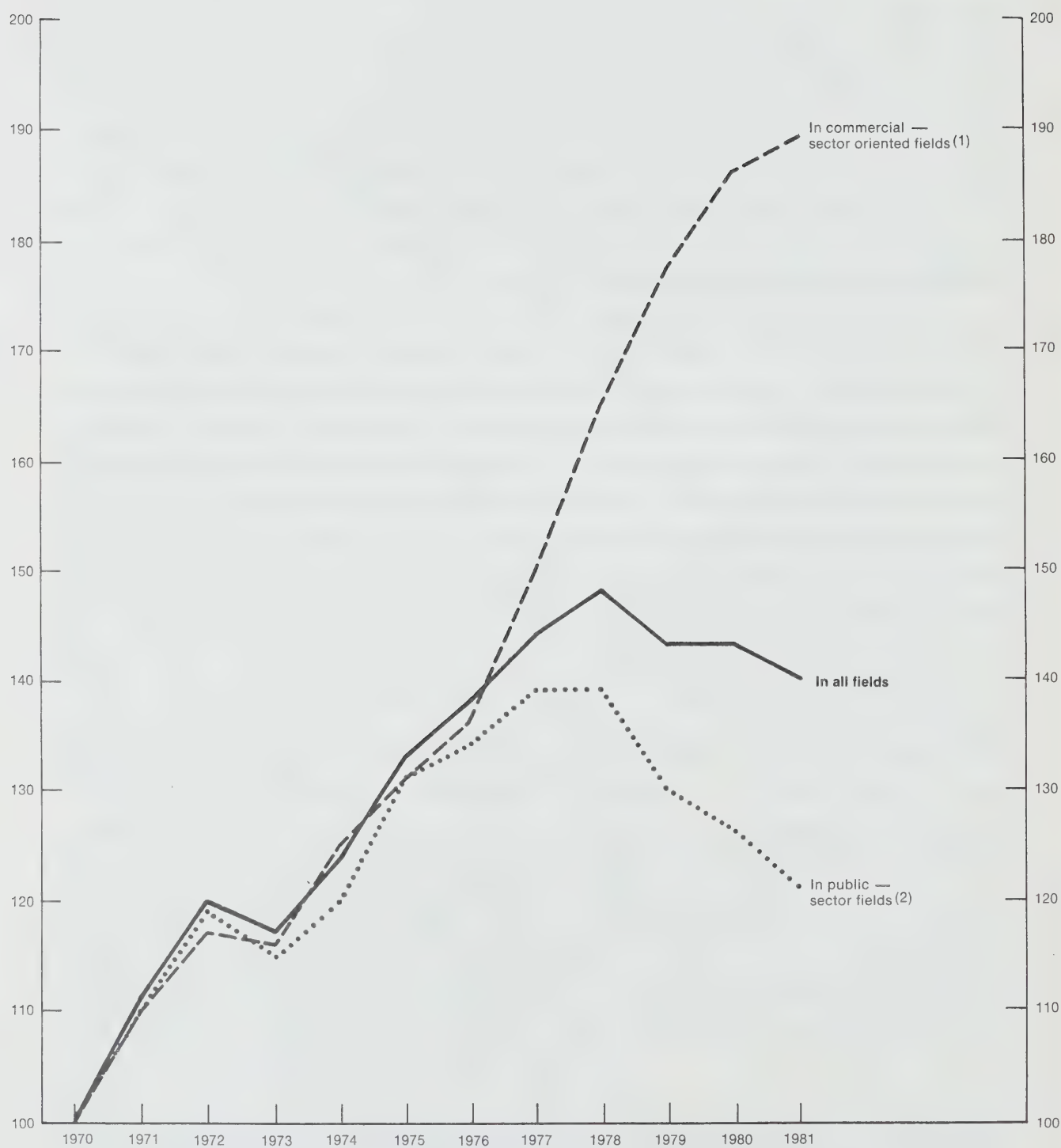
At the bachelor's level, the reaction was two-fold. First, there was some decline in the number of graduates in the middle to late 1970s (Chart 18). Following an average annual increase of 6 per cent between 1970 and 1975, the growth in the number of bachelor's degrees granted slowed to an annual average of 3.4 per cent between 1975 and 1978, and then declined to an annual average of -1.7 per cent between 1978 and 1981. University enrolment started increasing again in 1979, however, and continues to rise at a rapid rate today (1982), so this decline in the number of graduates is likely to be short-lived.

²⁹ Employment and Immigration Canada, Labour Market Development in the 1980s, (Ottawa: Supply and Services, 1981), p. 157.

³⁰ Unfortunately, university enrolment was not classified in the 1970s using the field of study grouping used in this report. Hence it could not be examined. This situation has recently changed.

Chart — 18

**Index of Growth in Bachelor's Degrees
Granted in Canada, 1970-1981, (1970=100)**



(1) Includes engineering/applied science, mathematics, physical sciences, economics, business/commerce.

(2) Includes education, humanities, social sciences (excluding economic and law), biological sciences, no specialization.

The second reaction at the undergraduate level is perhaps more significant; there was a movement away from public-sector oriented fields of study.

Chart 18 shows that between 1970 and 1976 the number of degrees granted in the two groups of fields (that is, public-sector and commercial-sector oriented), rose at about the same rate. After 1976, the number of degrees granted in the commercial-sector fields increased dramatically, reaching 1.9 times the 1970 level by 1982. The growth in the number of degrees granted in public sector fields, on the other hand, began to fall late in the decade, attaining only 1.2 times the 1970 level by 1981.

Table 20 presents these observations in a different way. Degrees granted in the commercial-sector oriented fields rose 39 per cent between 1976 and 1981. Every discipline in the group registered an increase, ranging from a high of 54 per cent for business/commerce, to 10 per cent for math and physical sciences. Degrees granted in public-sector oriented fields, however, fell by 9 per cent during the same period, with every discipline in the group registering a decline (detailed statistics are given in Appendix F).

Thus, the mix of bachelor's graduates entering the labour market, after having remained relatively stable between 1970 and 1976, changed dramatically between 1976 and 1981. The proportion in commercial-sector oriented fields rose from 20 to 27 per cent; in public-sector oriented fields it fell from 72 to 64 per cent, and in the professional fields from 8 to 9 per cent.

There was an obvious reaction on the part of students at the bachelor's level to the changing employment opportunities in the labour market, resulting in a move away from the public-sector oriented fields. This is, of course basically the type of change in mix of education recommended by the Employment and Immigration Task Force.

Table 20. Change in Degrees Granted between 1976 and 1981 in Canada,
by Field of Study

Bachelor's		Master's Doctoral	
-----Per cent-----			
Commercial-Sector Oriented Fields	+39	Education	+33 +27
Business/Commerce	+54	Humanities	- 2 +13
Engn. Science	+49	Social Sciences	+ 4 + 8
Economics	+26	Bio. Sci./ Agri.	+ 2 +11
Math/Phys. Sci.*	+10	Math/Phys. Sci.	-17 -11
Public-Sector Oriented Fields	- 9	Health	+73 +3
Social Sciences**	- 3	Engineering	+ 2 +12
Education	-16	Business/Com.	+27 -
Humanities	- 7		
No Specialization	- 6		
Nursing	+ 2		
Professional Field	+11		
Total	+ 2	Total	+12 + 6

* Virtually all the increase between 1976 and 1981 in the category was due to an estimated 50 per cent increase in degrees granted in computer science. Degrees granted in mathematics and the physical sciences were at approximately the same level for both years.

** excluding economics and law.

B. Master's and Doctoral Graduates

At the master's and doctoral levels, the reaction of students to the slow-down in public sector job opportunities as reflected by statistics on degrees granted was less evident. It must be remembered, however, that the higher the education level, the more dependent the graduates have traditionally been on the public sector for employment. At the doctoral level, all fields except engineering placed the vast majority of graduates in the public, not commercial, sector. Thus, there are few commercial-sector oriented fields to which students can move.

Table 21. Distribution by Field of Study of Bachelor's Degrees Granted in Canada, 1970, 1976, and 1981

	1970	1976	1981
Public-Sector Oriented Fields	73.6	71.8	63.8
Biological Sci./Agric.	5.4	7.0	6.0
Social Sciences*	13.3	15.1	14.4
Education	20.3	23.5	19.3
Humanities	17.2	14.7	13.4
No Specialization	15.3	9.8	9.1
Nursing	2.1	1.6	1.6
Commercial-Sector Oriented Fields	20.3	20.1	27.3
Business/Commerce	4.9	7.4	11.1
Engn./Applied Sci.	6.7	5.8	8.4
Economics	2.6	2.3	2.8
Math/Phys. Sciences	6.0	4.7	5.0
Professional Fields	6.2	8.1	8.9
TOTAL	60,523	83,292	84,918

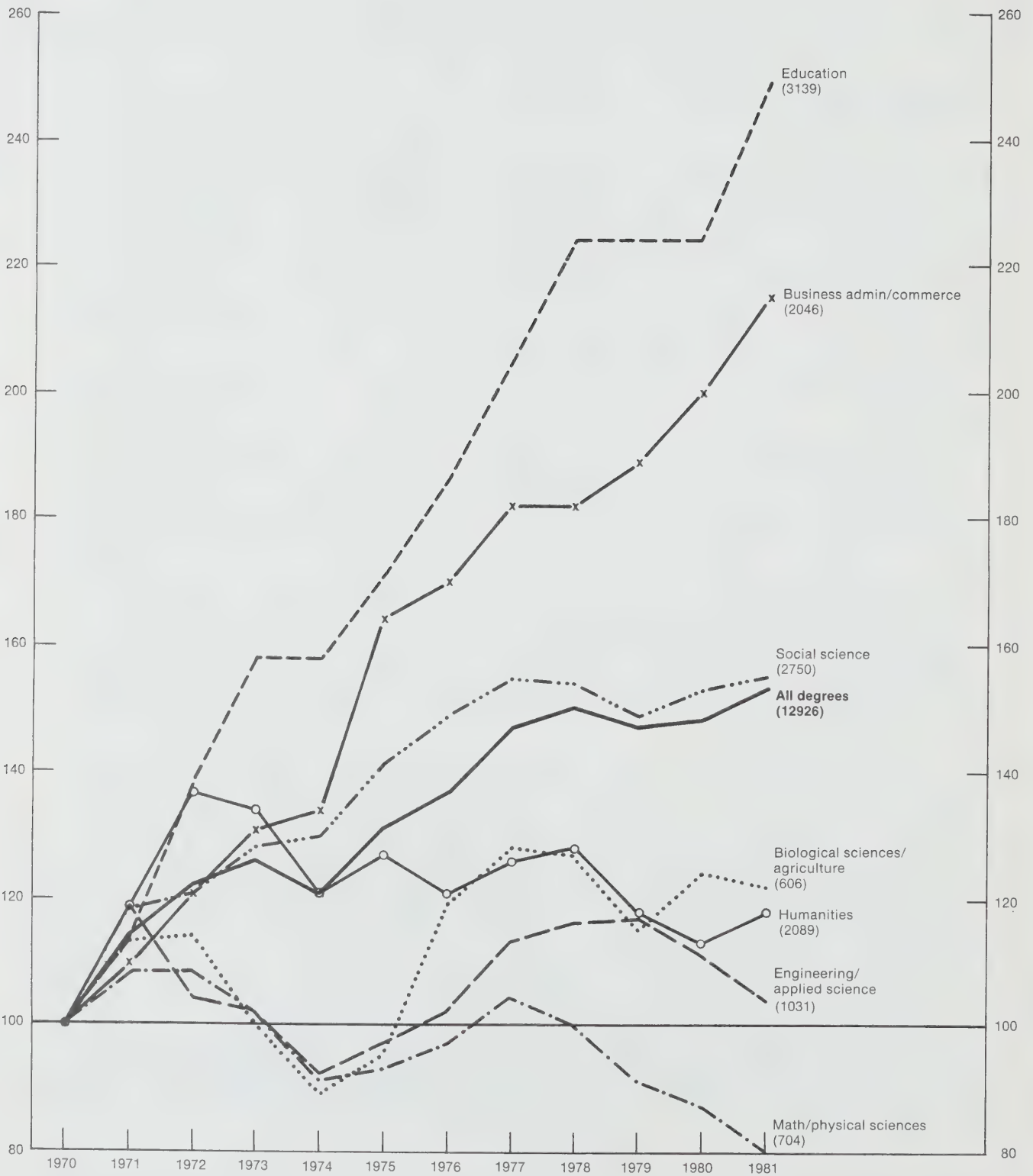
* excluding law and economics

One general reaction has been a decrease in the supply of graduates. The number of graduates at the master's level rose 47 per cent between 1970 and 1977 and has changed very little since then (Chart 19). The number of doctoral degrees granted has in fact been slowly declining since 1973, and in 1981 was 7 per cent lower than in 1973. Thus, an overall curtailment of growth has occurred.

By field of study, growth in education and business degrees has been the highest since 1976 (Chart 20). Graduate degrees in mathematics and the physical sciences registered the largest decline between 1976 and

Chart — 19

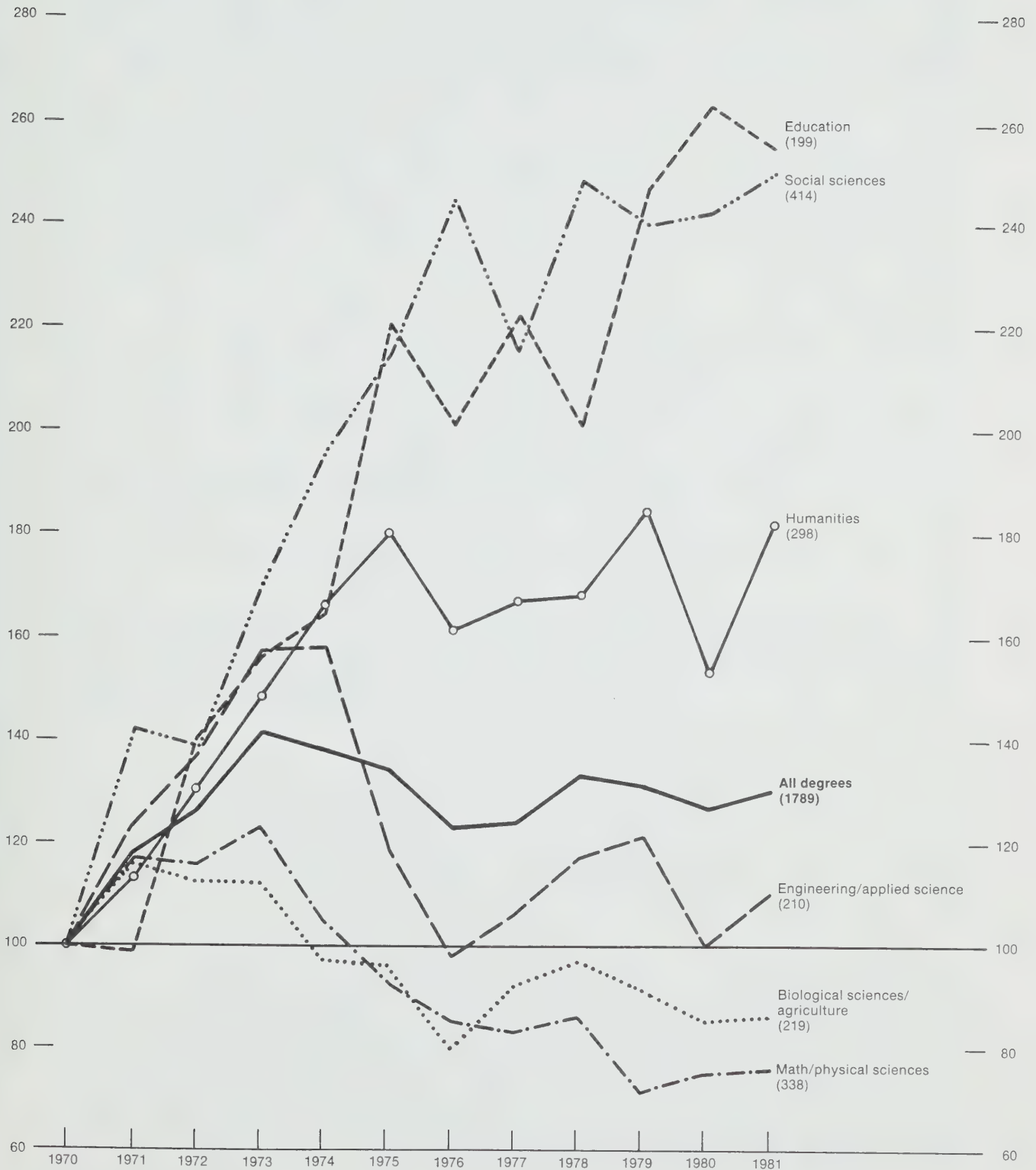
**Index of Growth in Master's Degrees
Granted in Canada, 1970-1981, (1970=100)**



() indicates number of degrees granted in 1981.

Chart — 20

**Index of Growth in Doctoral Degrees
Granted in Canada, 1970-1981, (1970=100)**



() indicates number of degrees granted in 1981.

Table 22. Distribution by Field of Study of Master's and Doctoral Degrees Granted in Canada, 1970, 1976, and 1981

	Master's			Doctoral		
	1970	1976	1981	1970	1976	1981
Education	15.0	20.3	24.3	5.7	9.3	11.1
Humanities	21.0	18.5	16.2	12.0	15.6	16.7
Social Sciences	21.1	22.9	21.3	11.5	22.7	23.1
Bio. Sci./Agric.	5.9	5.1	4.7	18.0	11.6	12.2
Math/Phys. Sci.	10.4	7.4	5.4	32.6	22.3	18.9
Health	3.4	2.8	4.3	6.3	6.2	6.0
Engineering	11.8	8.8	8.0	13.9	11.1	11.7
Business/Commerce	11.3	14.0	16.2	--	--	--
Total	8,424	11,555	12,926	1,372	1,693	1,789

1981. In engineering, the one field which at all levels has strong ties to the commercial sector, the number of graduate degrees granted has moved irregularly over the past 5 years, with no obvious upward or downward trend. In short, aside from a decline in the total number of graduates at the doctoral level and a slowdown at the master's level, the reaction of graduate students to the declining public sector job opportunities is not obvious. A more in-depth analysis of enrolment, graduates, and economic trends would be necessary to address this question.

Of course, it is unlikely that students categorized the fields of study as commercial- or public-sector oriented, as has been done here. Rather, it is more likely that declining job opportunities for graduates from most fields, and in particular from those traditionally relying on the public sector for employment, were observed by students and caused them to move into fields not so affected by declining public sector growth.

For this movement to have been reflected in the 1977 statistics on degrees, it would have to have started in the enrolment patterns around 1973. As noted, the latest national data on the employment of graduates are for graduates of 1976. Since the major shift in the mix of graduates by field of study has occurred since 1976, however, the findings of a national graduates survey conducted in 1982 for 1980 graduates, for example, would likely be different than those of the 1978 survey. Almost certainly the overall proportion of bachelor's graduates entering the public sector would have declined since 1978 with the change in the mix of graduates and the continued slower growth in the public sector.

Whether the relationship between particular fields of study and employment in various industries or occupations would have changed significantly is another question. These relationships remained very similar between the early and late 1970s and may continue today. The current recession, however, would make comparison with earlier periods difficult, as any deterioration in job opportunities would likely be due primarily to the downturn in the economy as a whole and in the commercial sector in particular. The business cycle obviously influences the types of jobs graduates obtain early in their careers. When the recession ends, the concern over the imbalance in supply and demand for graduates from various disciplines may well return.

CLOSING COMMENTS

It is hoped that the way in which the available data were analysed has improved the reader's understanding of the relationship between education and employment, at least for university graduates early in their careers.

Perhaps most important, it was possible to see some of the major employment patterns that persisted over a seven-year period: for example, the graduates from various fields who entered the public or commercial sectors, and the proportion of graduates in non-HQM occupations. Knowledge of the stability of these patterns obviously influences the way in which analysts and managers in education and labour react to such findings. Persistent employment patterns that are deemed not to be in the best interest of the students, the economy, or society as a whole may invoke policies to alter such patterns even if these policies simply take the form of increasing the information available to students on current and projected employment opportunities. Less attention would and should be paid to temporary employment patterns.

Time-series data on employment patterns also allow for better interpretation of some variables, such as the proportion of graduates in highly qualified manpower (HQM) occupations. Since it is difficult to classify many occupations as requiring or not requiring postsecondary education, it is difficult to interpret the variable in an absolute sense. But information on the changes over time can be meaningful. The fact that the proportion entering HQM occupations fell dramatically from 1971 to 1978 among graduates in some fields of study (for example, the biological sciences) while rising for graduates of others (such as business and commerce graduates) is an indication of changes in the labour market for graduates in various fields, and as such is valuable information.

For these reasons, as well as for the information such surveys provide manpower analysts attempting to construct models of the interaction between education and employment, it is hoped that similar data will be made available in the future. It could then be determined if the patterns and trends

observed for the 1970s are continuing in the 1980s. If such a survey would allow the time-series analysis to be extended to other parts of the education system, long-term employment patterns of university graduates could be discussed within the context of all those who leave school.

Various other questions also remain. From a labour market perspective, for example, has the shift in the mix of bachelor's graduates by field of study been sufficient to rectify the discrepancy in supply and demand documented by the studies in the 1970s, or do universities need to adjust their programs further, as called for by the Task Force on Labour Market Developments in the 1980s? The appropriateness of the balance of employment in the two sectors and the commercial sector's responsibility for training and employing more general degree graduates are issues that cannot be competently addressed in a statistical report such as this. Related questions, however, can and should, perhaps, be examined further. Why, for example, was there such a difference in the proportion of humanities graduates employed in the commercial sector in Canada and the United States, and what is their utilization in these industries?

It is hoped that this study will contribute to a discussion on issues such as these.

Appendix A

THE INTERPROVINCIAL MOVEMENT OF UNIVERSITY GRADUATES

The interprovincial movement of graduates depends on the level of economic activity in general, and in each province in particular. Thus, the observations for the two periods reported here, 1969 to 1971 and 1976 to 1978, cannot be assumed to hold for all time periods. The strength of the economy in western Canada vis-à-vis eastern Canada was obviously an important factor throughout the late 1970s.

There are other limitations as well.

Strictly speaking the data cannot be construed as migration data, since the movement does not necessarily indicate a change in permanent resident. Students often go to another province to attend a postsecondary institution, and then return to their home province following graduation. This is particularly true in the Maritimes, where movement among the three provinces is encouraged for specialized programs. For this reason, the Maritimes are shown as a single category in some places.

Since Québec did not participate in the 1978 survey, data are not available for Québec for that year. The distribution observed in 1971 was used to estimate the movement of Québec graduates to other provinces in 1978. No data are shown for Québec itself in 1978.

These data refer to the interprovincial movement of graduates from Canadian universities only. Nothing can be inferred regarding the movement of graduates to other countries, or from other countries into Canada.

Despite these limitations and the fact that the data are somewhat dated, it is possible to gain some indication of the extent and direction of movement of university graduates during the two years following graduation.

From the data presented in Tables A1 to A4, and Chart 21, a few salient observations can be made.

1. For Canada as a whole, approximately 15 per cent of 1969 university graduates moved to another province between 1969 and 1971, and 10 per cent of 1976 graduates between 1976 and 1978.
2. Persons with graduate degrees (master's or doctoral) were more likely to move than those with bachelor's degrees. In 1971 roughly 14 per cent of bachelor's graduates were resident in a different province from that in which they had graduated two years earlier, as compared to 24 per cent of master's or doctoral graduates. During the 1976 to 1978 period, the comparable figures were 10 per cent for bachelor's graduates, and 14 per cent for master's or doctoral graduates.
3. Table A1 and Chart 21 indicate the movement of graduates to new provinces. When movements into and out of a province are accounted for, it can be established whether a province has experienced a net gain or loss (Tables A2 to A4). This gain or loss can be expressed as a percentage of the persons graduating in the province two years earlier.

On this basis, the provinces with the largest percentage gains of graduates due to interprovincial movement during 1969 to 1971 and 1976 to 1978 were Newfoundland and Alberta, and British Columbia between 1976 to 1978 (see Chart 21). Those with the largest percentage loss included the Maritimes and Manitoba, and Saskatchewan in 1969 to 1970. Only two provinces changed their status during the two periods: Ontario went from a net gain in graduates of 4 per cent in 1969 to 1971 to a loss of 1.9 per cent in 1976 to 1978, and British Columbia from a net loss of 1.1 per cent in 1969 to 1971, to a net gain of 12.8 per cent in 1976 to 1978.

Chart — 21

Inter-Provincial Movement of Graduates: Percentage Gain or Loss of Graduates through Inter-Provincial Movement during the Two Years following Graduation, by Province, 1969-71 and 1976-78.

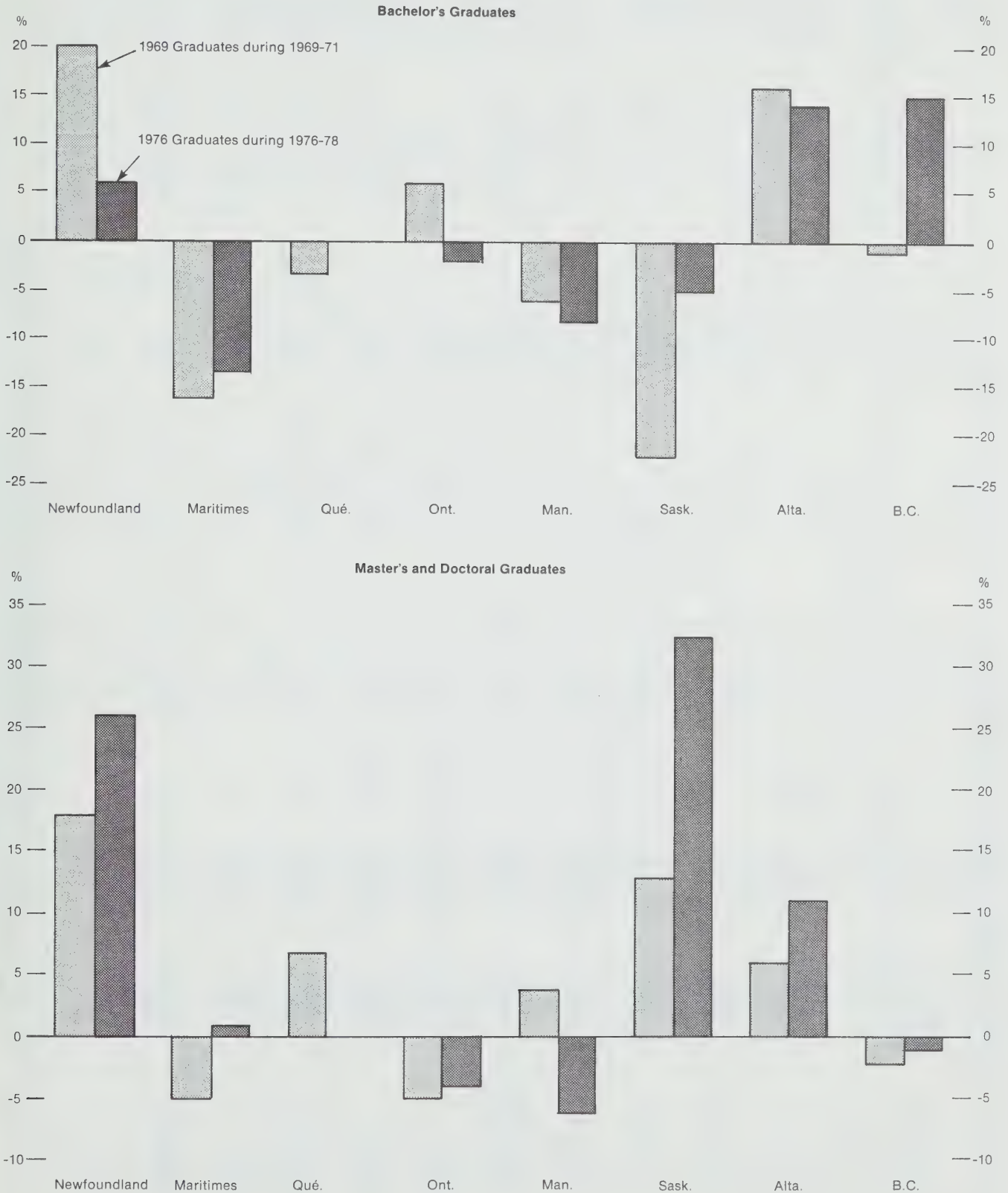


Table A1. Interprovincial Movement of 1969 and 1976 University Graduates:
Province of Graduation and of Residence Two Years Later, 1969 and 1976

Province of Graduation	Year of Graduation	Number	Nfld.	P.E.I.	N.S.	N.B.	Qué.	Ont.	Man.	Sask.	Alta.	B.C.
-----Pert cent distribution-----												
Nfld.	1969	581	88.7	--	5.7	0	0	--	0	0	0	--
	1976	1,350	92.3	--	--	--	--	4.4	--	0	--	--
P.E.I.	1969	127	--	69.3	4.2	11.0	0	6.2	0	0	--	--
	1976	255	--	73.7	5.7	6.1	--	--	0	--	--	--
N.S.	1969	2,057	2.7	1.9	64.6	4.2	7.0	12.6	1.2	--	1.9	2.9
	1976	3,993	2.2	2.9	69.7	9.3	1.5	7.3	--	--	4.5	1.5
N.B.	1969	1,451	--	2.4	13.2	57.4	8.8	13.2	0	0	2.6	--
	1976	2,608	--	1.3	7.4	76.4	4.0	6.2	--	--	2.6	--
Maritimes*	1969	3,635	2.0	--	72.2	--	7.5	12.6	0.7	--	2.2	2.1
	1976	6,856	1.7	--	83.2	--	2.5	6.7	0.5	0.4	3.7	1.2
Québec	1969	12,635	--	--	0.4	0.5	89.1	7.6	--	--	1.1	0.7
	1976	Data not available										
Ontario	1969	15,849	0.5	--	1.0	--	4.4	89.2	0.8	0.8	1.2	1.2
	1976	39,560	--	--	--	--	3.6	92.9	--	--	1.2	0.9
Manitoba	1969	2,584	0	0	--	--	2.2	6.7	81.2	2.1	4.3	2.7
	1976	3,975	--	--	--	--	0.6	6.3	84.1	1.6	4.1	2.5
Sask.	1969	2,423	--	0	--	--	--	7.0	4.3	67.0	16.0	4.6
	1976	2,942	--	0	0	--	--	1.8	2.2	83.7	7.8	3.5
Alberta	1969	3,587	--	0	--	--	1.2	4.4	0.7	2.5	85.4	4.1
	1976	6,006	--	--	0	0	--	1.9	--	2.2	89.9	5.2
B.C.	1969	4,169	--	0	--	--	2.3	9.7	0.9	0.6	3.5	81.8
	1976	4,834	--	--	--	--	--	2.7	--	0.8	3.3	91.5

* includes Nova Scotia, New Brunswick, and Prince Edward Island

-- indicates the number was too small to be statistically reliable.

Table A2. Net Gain or Loss of Graduates from Interprovincial Movement during the Two Years following Graduation, All Degree Levels

Province	1 Year of Graduation in province	2 Total number graduating No. resident in same province 2 years later	3 Entering from other provinces	4 Total # in prov. 2 years after graduation (2+3)	5 Net gain or loss (4-1)	6 Per cent gain or loss (5/1 x 100)
Nfld.	1969	581	183	698	117	20.1
	1976	1,350	212	1,458	108	8.0
P.E.I.	1969	127	102	190	63	49.6
	1976	255	166	354	99	38.8
N.S.	1969	2,057	485	1,815	-242	-11.8
	1976	3,993	347	3,131	-862	-21.6
N.B.	1969	1,451	245	1,079	-372	-25.6
	1976	2,608	537	2,529	-79	-3.0
Maritimes*	1969	3,635	460	3,084	-551	-15.2
	1976	6,856	308	6,014	-842	-12.3
Quebec	1969	12,635	1,174	12,432	-203	-1.6
	1976	Data not available				
Ontario	1969	15,849	2,348	16,485	636	4.0
	1976	39,560	2,045	38,814	-746	-1.9
Manitoba	1969	2,584	354	2,451	-133	-5.1
	1976	3,975	313	3,658	-317	-8.0
Sask.	1969	2,423	334	1,950	-473	-19.5
	1976	2,942	417	2,880	-62	-2.1
Alta.	1969	3,587	1,065	4,129	542	15.2
	1976	6,006	1,441	6,839	833	13.9
B.C.	1969	4,169	710	4,124	-45	-1.1
	1976	4,834	1,030	5,454	620	12.8

* includes Prince Edward Island, Nova Scotia, and New Brunswick

Table A3. Net Gain or Loss of Graduates from Interprovincial Movement during the Two Years following Graduation, Bachelor's Graduates

Province	Year of Graduation	1 Total number graduating in province	2 No. resident in same province 2 years later	3 Entering from other provinces	4 Total # in prov. 2 years after graduation (2+3)	5 Net gain or loss (4-1)	6 Per cent gain or loss (5/1 x 100)
Nfld.	1969	542	499	153	652	110	20.3
	1976	1,240	1,151	168	1,319	79	6.4
P.E.I.	1969	127	88	83	171	44	34.6
	1976	255	188	143	331	76	30.0
N.S.	1969	1,931	1,252	443	1,695	-236	-12.2
	1976	3,707	2,585	283	2,868	-839	-22.6
N.B.	1969	1,337	778	211	989	-348	-26.0
	1976	2,447	1,880	485	2,365	-82	-3.4
Maritimes*	1969	3,395	2,478	377	2,855	-540	-15.9
	1976	6,409	5,357	207	5,564	-845	-13.2
Québec	1969	11,513	10,328	904	11,232	-281	-2.5
	1976	Data not available					
Ontario	1969	13,141	11,931	1,984	13,915	774	5.9
	1976	33,961	31,756	1,687	33,443	-518	-1.5
Manitoba	1969	2,363	1,948	273	2,221	-142	-6.1
	1976	3,606	3,076	236	3,312	-294	-8.1
Sask.	1969	2,275	1,556	227	1,783	-492	-21.6
	1976	2,752	2,322	306	2,628	-124	-4.5
Alta.	1969	3,159	2,789	885	3,674	515	16.3
	1976	5,347	4,871	1,236	6,107	760	14.2
B.C.	1969	3,701	3,095	569	3,664	-37	-1.0
	1976	4,114	3,830	909	4,739	625	15.2

* includes Prince Edward Island, Nova Scotia, and New Brunswick

Table A4. Net Gain or Loss of Graduates from Interprovincial Movement during the Two Years following Graduation, Master's and Doctoral Graduates

Province	1 Year of Graduation in province	2 Total number graduating in province	3 No. resident in same province 2 years later	4 Entering from other provinces	5 Total # in prov. 2 years after graduation (2+3)	6 Net gain or loss (4-5) Per cent gain or loss (5/1 x 100)
Nfld.	1969 1976	39 110	16 95	30 48	46 143	7 33 17.9 30.0
P.E.I.	1969 1976	-- --	-- --	19 34	19 34	-- --
N.S.	1969 1976	126 286	78 199	42 56	120 255	-6 -31 -4.8 10.8
N.B.	1969 1976	114 161	56 112	34 44	90 156	-24 -5 -21.1 3.1
Maritimes*	1969 1976	240 447	146 349	83 115	229 464	-11 17 -4.6 3.8
Québec	1969 1976	1,122 Data not available	930	270	1,200	78 6.9
Ontario	1969 1976	2,708 5,599	2,206 5,013	364 358	2,570 5,371	-138 -228 -5.1 -4.1
Manitoba	1969 1976	221 369	149 269	81 77	230 252	9 -23 4.1 -6.2
Sask.	1969 1976	148 190	60 141	107 111	167 346	19 62 12.8 32.6
Alta.	1969 1976	428 659	275 527	180 213	455 740	27 81 6.3 12.3
B.C.	1969 1976	468 720	319 594	165 131	484 725	16 5 3.4 0.7

* includes Prince Edward Island, Nova Scotia and New Brunswick.

Appendix B

THE OCCUPATIONAL AND INDUSTRIAL DISTRIBUTIONS FOR THREE DIFFERENT SUBPOPULATIONS OF BACHELOR'S GRADUATES

All graduates employed as of two years following graduation were included in the analysis in the report. Because of a number of variables that could affect their occupation and industry of employment, this group was not homogeneous. The selection and analysis of subgroups of graduates homogeneous with respect to such variables as the number of years worked prior to entering university could shed more light on the types of jobs obtained by graduates with varying degrees of labour force experience. Unfortunately, the information necessary to identify subpopulations such as these was not available in both surveys. Thus, for the sake of comparability, all employed graduates were included in the data in the main body of the report.

The 1978 survey does, however, allow some of the important subgroups to be identified and their occupational and industrial distributions examined.

For example, it is possible that some graduates in, say, the humanities, obtained further education between graduation and the survey date two years later. While still listed as humanities graduates in the survey, they may in fact have received another degree, diploma, or certificate. As well, some graduates may have continued in school and in fact held summer jobs when the surveys were taken, since both were conducted in June. Thus, education and labour force experience in the two years following the graduation are important factors. To eliminate those who may have held summer jobs, or who had taken further education after graduation, a subpopulation of graduates in continuous employment during the two years following graduation was selected from the 1976 to 1978 data. The occupational distributions were then compared with that of all employed graduates, the population analysed in the body of the report.

As mentioned earlier, some graduates may have entered university with considerable work experience, perhaps even as a professional in a field such as teaching. This could influence the occupation and industry of employment following graduation. Thus, work experience prior to graduation may be a significant factor. Many graduates take their education as part-time students and remain in the labour force throughout their university years.¹ This could also affect their employment status following graduation. A second subpopulation was selected from the 1976 to 1978 data who (1) had little work experience prior to entering university, (2) attended university as full-time students, and (3) had no further education following graduation.

These subpopulations were examined to determine if their occupational and industrial distributions differed from that of the entire population of employed graduates. This work was done for bachelor's graduates only, since they were the group most likely to be affected by these considerations.

There are, then, three groups for which the occupational and industrial distributions are shown and compared:

- Group A: All 1976 bachelor's graduates employed in June 1978 (49,000 persons)
- Group B: Those 1976 bachelor's graduates who did not take further full-time education between 1976 and 1978 and who were employed in June 1978 (40,450 persons).²
- Group C: Those 1976 bachelor's graduates who had little work experience (less than one year total experience or no single job for more than 6 months) prior to entering university, attended university as full-time students, took no further full-time education between 1976 and 1978, and were not out of the labour force for more than 6 months between 1976 and 1978 (19,936 persons).

¹ Approximately 20 per cent of the 1976 graduates employed in 1978 were part-time students during their last year of study, ranging from a high of 30 per cent among humanities graduates to a low of 3 per cent among graduates in the health field.

² Group B is Group A excluding (1) those who were enrolled full-time as of Oct. 1977, and (2) others who were out of the labour force for more than six months between graduation and June 1978 and hence may have taken further education full-time between 1976 and 1978.

Some observations

The differences between Group A (all employed 1976 graduates) and Group B (excluding those who may have taken further education on a full-time basis between 1976 and 1978) is approximately 9,000 or 18 per cent of the 49,500 employed graduates. This consists of approximately 7,000 who were full-time students as of October 1977 and a further 2,000 who were out of the labour force for more than 6 months and hence may have taken further education during the 1976-77 academic year.

By dividing group A into two groups--those who did and those who did not take further education during the two years--it may be seen that there was a difference in the occupations obtained by each group.

Occupation Two Years after Graduation									
	Number	Management	Teaching	Social Science Occns	Health	Sci./ Engn./ Math	Clerical	Sales	Other Non-HQM
			----Per cent Distribution----						
Further Education	9,136	9.4	23.6	14.5	7.6	10.0	7.8	11.9	15.2
No Further Education	40,450	14.5	40.4	6.6	6.9	9.8	7.3	6.9	7.6

For example, those who continued their education between 1976 and 1978 were more likely to be in non-HQM jobs, be they clerical, sales and service, or some other non-HQM. It is likely that part of this population, being students in 1977-78, would have held a summer job as of June 1978.

Despite the differences in the two populations just compared, Tables B1 and B2 indicate that the difference in the occupational and industrial distributions of group A and group B was not significant enough to render the results unusable. This is not because there was no difference in the two

groups shown in the table above but because the second population was only 18 per cent of all employed graduates.

The largest difference in the occupational distributions of groups A and B was in teaching: 37 per cent of group A were teaching compared to 40 per cent of group B.

For the industrial distributions, the largest difference was, not surprisingly, in the education sector, where 41.2 per cent of group A were employed as compared to 43.6 per cent of group B. Strictly speaking, the distributions for group B are probably a better reflection of the industries and occupations entered by 1976 graduates after two years in the labour force.

There was a significant difference in the distributions between group C and groups A and B.

Fewer of the young inexperienced graduates in group C were employed in teaching following graduation, (32 per cent compared to 37 per cent for all employed graduates in group A, 40 per cent for group B) and generally more entered the commercial sector (approximately 45 per cent as compared to 40 per cent for group A, that is, all employed graduates, and 41 per cent for group B).

The data show that graduates were not a homogeneous group with respect to work experience, enrolment status while in university, and activities during the two years following graduation. Choosing different subgroups of all employed graduates can reveal a difference regarding the occupation they were likely to enter. A more detailed analysis of this topic was not pursued in the report because the files on 1969 graduates did not contain the data necessary to define such subgroups. Thus, it was decided to conduct the comparison of the 1969 and 1976 graduates keeping all employed graduates in the population.

Table B1. Employment by Occupation for Three Subpopulations of Bachelor's Graduates
Two Years after Graduation, by Field of Study, 1978

Field of Study	Group	Number	Manag./ Admin.	Teaching	Soc. Sci.	Health Occns.	Sci. Engn./ Math	Arts	Cler.	Sales	Service	Other Non-HQM Occns	TOTAL
Business/ Commerce	A	3,604	56.3	7.0	3.5	-	3.2	-	13.6	10.1	2.2	4.1	100
	B	3,312	57.8	6.6	2.8	-	3.0	-	13.7	10.6	1.6	3.3	100
	C	2,028	59.6	3.7	2.9	-	2.1	-	15.8	11.4	1.1	3.4	100
Education	A	10,274	5.2	79.5	2.9	0.6	0.9	0.6	3.6	1.8	1.2	3.7	100
	B	9,537	4.8	81.6	2.6	0.5	0.9	0.5	3.6	1.7	0.7	3.1	100
	C	4,292	4.0	81.3	1.8	0.8	0.7	0.2	5.2	1.8	0.6	3.6	100
Soc. Sci.	A	12,885	16.4	30.0	21.0	1.6	3.8	1.2	8.4	6.6	4.2	6.8	100
	B	9,754	18.1	34.1	18.2	1.6	3.4	1.2	8.8	6.5	3.4	4.7	100
	C	3,981	19.9	20.4	23.6	1.2	3.9	1.5	12.9	7.6	3.9	5.2	100
Health	A	2,778	3.1	2.9	-	89.2	-	-	1.4	0.9	-	2.5	100
	B	2,289	3.2	3.3	-	90.2	-	-	1.1	1.1	-	0.2	100
	C	1,540	1.3	1.3	-	93.7	-	-	1.5	0.7	-	0.2	100
Engn./ App. Sci.	A	2,684	8.7	2.7	-	-	71.6	-	-	3.4	2.0	11.6	100
	B	2,377	9.5	1.8	0.1	0.5	70.6	0.8	0.9	3.7	2.2	9.9	100
	C	1,410	9.5	0.6	0.2	0.9	70.4	0.3	1.4	2.8	1.6	12.3	100

Table B1. (Cont'd). Employment by Occupation for Three Subpopulations of Employed Bachelor's Graduates Two Years After Graduation, by Field of Study, 1978

Field of of Study	Group	Number	Manag./ Admin.	Teaching	Soc. Sci.	Health Occns	Sci./ Engn./ Math	Arts	Cler.	Sales	Service	Other Non-HQM Occns.	TOTAL
Math/ Phys. Sci.	A	2,897	14.1	18.8	-	-	45.7	-	4.3	5.2	1.9	10.0	100
	B	2,353	15.3	18.6	-	-	46.7	-	4.3	5.8	1.0	7.2	100
	C	1,335	12.2	16.7	-	-	52.1	-	4.8	4.2	1.0	7.8	100
Bio. Sci./ Agric.	A	3,802	9.8	21.5	3.7	13.1	18.0	-	8.8	5.7	4.5	14.9	100
	B	2,664	9.7	22.8	3.2	12.7	17.4	0.7	8.6	6.6	3.8	14.5	100
	C	1,662	11.0	18.0	3.0	11.8	17.4	0.7	12.4	6.0	4.9	14.8	100
Humanities	A	7,785	9.6	45.8	6.1	0.9	1.4	7.4	12.2	4.4	4.0	8.2	100
	B	5,966	10.5	49.1	5.1	0.7	1.4	7.7	12.8	3.7	2.8	6.2	100
	C	2,590	13.6	36.6	5.6	0.7	0.7	9.6	18.1	4.5	3.3	7.3	100
General	A	587	8.6	34.9	11.9	8.9	10.5	-	-	11.0	6.2	8.0	100
	B	477	10.2	35.9	12.2	8.5	10.6	2.3	3.5	8.8	5.3	2.7	100
	C	183	11.9	25.5	12.0	6.0	15.7	-	7.0	15.9	2.0	15.9	100
TOTAL (nine prov.)	A	49,585	13.6	37.3	8.0	7.0	9.9	2.3	7.4	4.8	3.1	6.6	100
	B	40,450	14.5	40.4	6.6	6.9	9.8	2.2	7.3	4.6	2.3	5.4	100
	C	19,935	15.5	31.7	6.7	9.2	11.6	2.4	9.7	4.9	2.4	6.1	100

Group A: all 1976 bachelor's graduates employed in June, 1978

Group B: those 1976 graduates employed in 1978 who did not take further full-time education during the two years following graduation

Group C: those 1976 graduates employed in 1978 who had little work experience prior to graduation, were full-time students in university, and who took no further full-time education during the two years following graduation.

Table B2. Employment by Industry for Three Subpopulations of Bachelor's Graduates Two Years after Graduation, by Field of Study, 1978

Field of Study	Group	Number	Ed.	Health/ Welfare	Serv. to Bus. Mgmt.	Other commun. & soc. serv.	Public Admin.	Manuf.	Finan./ Insur.	Trade	Transp./ Commun.	Other Indus.	TOTAL
Bus./ Comm.	A	3,623	8.0	-	30.4	3.9	11.7	13.0	14.4	8.3	5.1	4.9	100
	B	3,312	7.8	-	31.3	3.8	10.8	13.5	14.6	8.4	5.0	4.8	100
	C	2,028	4.4	-	34.6	3.7	9.7	11.9	15.5	8.9	4.8	6.5	100
Education	A	10,298	82.5	1.3	0.9	2.8	5.0	2.5	1.5	1.1	1.2	1.2	100
	B	9,537	84.5	1.2	0.6	2.3	4.6	2.3	1.5	1.1	1.1	0.8	100
	C	4,292	82.7	1.8	0.7	2.1	4.6	2.5	1.7	1.3	1.7	0.9	100
Fine Arts	A	1,608	46.6	-	4.3	14.4	10.9	6.0	3.5	7.1	3.1	4.1	100
	B	1,095	48.7	-	4.9	13.9	10.3	4.8	2.3	6.7	4.0	4.0	100
	C	618	50.9	-	7.9	12.4	10.8	3.1	2.0	4.0	5.8	2.4	100
Humanities	A	7,799	52.1	2.5	3.1	7.1	10.2	7.9	4.7	5.4	3.9	3.1	100
	B	5,966	55.5	2.6	2.2	5.7	8.8	8.3	4.6	5.2	4.2	2.9	100
	C	2,590	42.1	3.8	3.1	7.2	9.3	10.1	7.0	8.0	5.2	4.2	100
Soc. Sci.	A	12,916	33.6	8.4	13.5	4.6	16.1	6.1	6.4	4.6	3.6	3.1	100
	B	9,754	37.2	9.0	11.0	3.7	15.1	5.3	7.1	5.1	3.7	2.8	100
	C	3,981	24.1	10.6	13.5	5.0	18.3	6.0	9.1	6.4	3.5	3.5	100
Bio. Sci./ Agric.	A	3,380	26.0	10.9	5.4	3.3	18.4	10.2	3.8	7.3	4.0	10.7	100
	B	2,664	26.0	10.4	4.2	3.4	19.0	10.7	3.7	7.2	3.2	12.2	100
	C	1,662	22.4	13.4	3.4	1.4	19.8	10.8	4.7	9.3	4.5	10.3	100

Table B2. (Cont'd). Employment by Industry for Three Subpopulations of Bachelor's Graduates
Two Years After Graduation, by Field of Study, 1978

Field of Study	Group	Number	Ed.	Health/ Welfare	Serv. to Bus. Mgmt.	Other commun. & soc. serv.	Public Admin.	Manuf. Insur.	Trade	Transp./ Commun.	Other Indus.	TOTAL
Engn./ App. Sci.	A	2,704	5.0	-	21.0	-	12.8	23.4	-	16.9	20.9	100
	B	2,377	2.4	-	21.3	-	11.9	25.0	-	17.0	20.4	100
	C	1,410	0.7	-	17.2	-	10.6	27.1	-	18.6	22.6	100
Health	A	2,784	4.3	70.0	-	-	10.4	-	12.7	-	2.6	100
	B	2,289	2.9	67.8	-	-	12.2	-	12.7	0.2	2.7	100
	C	1,540	1.3	68.0	-	-	11.0	-	14.7	0.2	3.1	100
Math/ Phys. Sci.	A	2,903	26.9	-	15.4	-	12.3	13.4	12.2	2.7	7.8	100
	B	2,353	25.1	-	15.7	-	12.4	13.8	12.9	2.9	8.6	100
	C	1,335	21.3	-	13.7	-	12.1	14.4	14.9	3.3	10.4	100
General	A	594	39.3	8.9	-	-	16.9	-	7.2	-	27.7	100
	B	477	41.9	8.1	-	-	17.9	-	7.2	-	7.0	100
	C	183	31.5	6.0	-	-	19.1	-	16.0	-	16.5	100
TOTAL (nine prov.)	A	49,751	41.2	8.2	9.2	4.1	11.7	7.5	5.1	4.8	4.1	100
	B	40,450	43.6	7.9	8.5	3.4	10.8	7.5	5.3	4.9	3.9	100
	C	19,935	34.3	10.1	9.7	3.6	11.4	8.5	6.6	6.2	4.7	100

Group A: all 1976 bachelor's graduates employed in June, 1978

Group B: those 1976 graduates employed in 1978 who did not take further full-time education during the two years following graduation

Group C: those 1976 graduates employed in 1978 who had little work experience prior to graduation, were full-time students in university, and who took no further full-time education during the two years following graduation.

Appendix C

A RANK-ORDERING OF MAJOR OCCUPATIONS AND INDUSTRIES
OF EMPLOYMENT FOR MEN AND WOMEN

TABLE C1. A Rank-Ordering of Major Occupations of Bachelor's Graduates Two Years after Graduation,
by Field of Study, 1971 and 1978

	Year	Employed graduates	Occupation								
			Number	----Per cent distribution----							
All graduates			Teaching	Science/ Math/ Engn.	Social sciences	Clerical	Health	Manage. support	Non-gov't admin.	Sales	Other occns
			(27)	(21)	(23)	(41)	(31)	(117)	(113/114)	(51)	
Canada	1971	38,252	41.5	11.2	8.0	7.9	6.2	5.7	4.0	3.5	12.0
Nine provinces	1978	49,580	37.3	9.9	8.0	7.4	7.0	6.5	5.9	4.8	13.2
Business, management and commerce			Manag. support	Non-gov't admin.	Clerical	Sales	Teaching	Social sciences	Other occns		
			(117)	(113/114)	(41)	(51)	(27)	(21)			
Canada	1971	2,100	46.0	4.3	14.6	10.5	3.2	3.3	18.1		
Nine provinces	1978	3,604	41.0	14.7	13.6	10.1	6.9	3.5	10.2		
Education			Teaching	Manag./ Admin.	Clerical	Social sciences	Sales	Recreation	Other occns		
			(27)	(11)	(41)	(21)	(51)	(37)			
Canada	1971	7,976	80.4	7.6	2.4	3.3	0.6	0.0	5.7		
Nine provinces	1978	10,274	79.5	5.2	3.5	2.9	1.7	1.2	6.0		
Humanities			Teaching	Clerical	Social sciences	Writing	Sales	Service	Other occns		
			(27)	(41)	(21)	(335)	(51)	(61)			
Canada	1971	7,132	46.6	13.8	6.1	2.1	4.6	2.0	24.8		
Nine provinces	1978	7,784	45.8	12.2	6.1	5.7	4.4	4.0	21.8		
Social sciences			Teaching	Law	Social sciences	Clerical	Non-gov't admin.	Manage. support	Other occns		
			(27)	(234)	(21)	(41)	(113/114)	(117)			
Canada	1971	7,746	31.0	13.9	24.7	9.6	2.0	8.3	10.5		
Nine provinces	1978	12,884	30.0	11.4	21.0	8.4	8.0	6.5	14.8		

TABLE C1. (Cont'd). A Rank-Ordering of Major Occupations of Bachelor's Graduates Two Years after Graduation, by Field of Study, 1971 and 1978

	Year	Employed graduates	Occupation						
		Number	---- Per cent distribution----						
Agriculture and biological sciences			Teaching (27)	Life sciences (213)	Health occns. (31)	Manag./ Admin. (11)	Clerical (41)	Sales (51)	Other occns
Canada	1971	2,046	32.0	14.4	14.4	6.4	6.4	3.2	23.2
Nine provinces	1978	3,802	21.5	10.2	13.1	9.8	8.8	5.7	30.9
Engineering/Applied Sci.			Engineers and arch. (214/215)	Engn. tech. & support (216)	Science or Math (211/213/218)	Manag./ Admin. (11)	Sales (51)	Teaching (27)	Other occns
Canada	1971	2,608	61.4	4.1	10.2	2.8	3.1	3.5	14.9
Nine provinces	1978	2,684	57.9	5.7	8.0	8.7	3.4	2.7	13.6
Health disciplines			Health occns (31)	Manag./ Admin. (11)	Teaching (27)	Clerical (41)	Social sciences (21)	Sales (51)	Other occns
Canada	1971	2,147	74.5	0.9	17.5	-	0.5	0.5	6.1
Nine provinces	1978	2,778	89.2	3.1	2.9	1.4	1.0	0.9	1.5
Math. and Physical sciences			Science/ Math/ Engn. (21)	Teaching (27)	Manag. Support (117)	Sales (51)	Clerical (41)	Non-gov't admin. (113/114)	Other occns
Canada	1971	2,980	39.7	29.6	6.2	2.3	4.1	2.7	15.4
Nine provinces	1978	2,897	45.6	18.8	9.6	5.2	4.3	3.9	12.6
No specialization			Teaching (27)	Social sciences (21)	Sales (51)	Science/ Math/ Engn. (21)	Health occns (31)	Manag./ Admin. (11)	Other occns
	1971	3,000	43.9	5.6	6.4	6.1	2.1	6.6	29.3
	1978	586	34.9	11.9	10.9	10.5	8.9	8.6	14.3

Note: Numbers in () refer to the CCDO occupational code for the category.

TABLE C2. A Rank-Ordering of Major Occupations of Bachelor's Degree Graduates Two Years after Graduation, by Field of Study and by Sex, 1971 and 1978

Male			Female		
Occupation	1971 (Canada)	1978 (Nine prov.)	Occupation	1971 (Canada)	1978 (Nine prov.)
----Per cent ----			----Per cent ----		
All Graduates					
Teaching	32.2	25.8	Teaching	59.0	50.2
Management/Admin.	13.3	18.0	Clerical	10.0	9.7
Sci./Engn./Math	15.5	15.1	Health	8.2	8.8
Social Sciences	8.7	8.3	Management, Admin.	3.9	8.7
Sales	4.5	6.1	Social Sciences	6.9	7.8
Health	5.1	5.4	Sci./Engn./Math	3.0	4.1
Other	20.7	21.3	Other	9.0	10.7
Number	25,040	26,090	Number	13,220	23,330
Business, Management & Commerce					
Manag. Support	46.8	43.7	Manag./Admin.	28.1	30.8
Administration	4.8	16.3	Clerical	19.0	22.5
Clerical	14.4	11.3	Teaching	25.2	18.3
Sales	10.9	9.9	Admin.	0.0	11.6
Teaching	2.3	4.2	Sales	--	10.8
Sci./Engn./Math	4.7	3.6	Social Sciences	8.7	3.3
Other	16.1	11.0	Other	19.0	2.7
Number	2,019	2,883	Number	82	707
Education					
Teaching	76.0	74.4	Teaching	85.7	82.9
Management Admin	12.0	7.0	Clerical	3.7	5.1
Social Sciences	4.4	3.4	Management/Admin.	2.3	4.0
Sales	0.7	2.4	Social Sciences	2.0	2.6
Construction/ Trades Occns	--	1.8	Sales	0.4	1.3
Service	--	1.5	Recreation	--	1.1
Other	6.9	9.5	Other	5.9	3.0
Number	4,335	4,035	Number	3,642	6,211
Humanities					
Teaching	40.2	35.4	Teaching	54.3	53.2
Management/Admin.	11.5	11.4	Clerical	18.8	13.6
Clerical	9.7	10.4	Management Admin.	4.8	8.4
Sales	6.4	6.1	Social Sciences	7.7	7.6
Writing	--	4.7	Writing	3.3	5.9
Service	2.3	4.7	Service	1.7	3.6
Other	29.9	27.3	Other	9.4	7.7
Number	3,889	3,178	Number	3,244	4,558
Social Science					
Teaching	27.3	19.9	Teaching	39.2	41.3
Management/Admin.	13.4	20.3	Management/Admin.	5.5	12.1
Law	18.8	16.8	Clerical	14.8	11.7
Social Sciences	9.6	7.2	Social Sciences	13.5	8.5
Sales	4.8	8.6	Law	2.9	5.2
Service	--	5.0	Sales	2.8	4.2
Other	26.1	22.2	Other	21.3	17.0
Number	5,368	6,765	Number	2,378	6,096

TABLE C2. (Cont'd.). A Rank-Ordering of Major Occupations of Bachelor's Degree Graduates Two Years After Graduation, by Field of Study and by Sex, 1971 and 1978.

Male			Female		
Occupation	1971 (Canada)	1978 (Nine prov.)	Occupation	1971 (Canada)	1978 (Nine prov.)
-----Per cent -----			-----Per cent -----		
Agric. & Bio. Sciences					
Teaching	18.8	15.8	Teaching	50.6	28.3
Management/Admin.	11.0	12.1	Medicine	15.9	16.9
Life Sciences	14.1	10.0	Clerical	3.0	12.9
Health	13.3	10.1	Life Sciences	13.5	10.7
Math/Engineering	7.1	10.1	Management/Admin.	--	7.1
Sales	4.1	6.8	Math/Engineering	1.2	4.9
Other	31.6	35.1	Other	15.8	19.2
Number	1,195	2,083	Number	851	1,704
Engineering					
Engineering	61.3	58.6	Engineering	--	45.2
Management/Admin.	2.8	8.1	Management/Admin.	--	22.8
Math/Science	10.2	7.8	Math/Science	--	10.3
Engr. Support	4.1	5.9	Sales	--	10.1
Contr./Trade	--	3.1	Artistic	--	3.5
Sales	3.1	3.1	Service	--	3.2
Other	18.5	13.4	Other	--	4.9
Number	2,590	2,555	Number	--	122
Health					
Medicine	86.8	93.3	Medicine	62.4	86.6
Management/Admin.	0.5	2.5	Teaching	33.3	4.5
Clerical	--	1.4	Management/Admin.	1.3	3.5
Processing	--	1.0	Social Sciences	0.6	1.6
Teaching	1.4	0.4	Clerical	0.6	1.3
Sales	1.0	0.3	Sales	--	1.3
Other	10.3	1.1	Other	1.8	1.2
Number	1,065	1,056	Number	1,081	1,706
Math & Physical Sciences					
Science/Engn./Math	40.1	46.1	Science/Engn./Math	37.2	44.3
Teaching	29.0	17.4	Teaching	33.8	23.0
Management/Admin.	8.8	15.1	Management/Admin.	11.8	10.8
Sales	2.4	4.7	Clerical	7.2	8.0
Clerical	3.6	3.2	Sales	2.0	6.8
Const. Trad.	--	2.2	Service	2.1	2.4
Other	16.1	11.3	Other	5.9	4.7
Number	2,527	2,243	Number	452	651
No specialization					
Teaching	28.5	17.7	Teaching	67.6	58.8
Science/Engn./Admin.	9.8	17.4	Social Sciences	6.5	19.6
Sales	7.8	16.8	Medicine	--	7.4
Management/Admin.	8.7	11.1	Management/Admin.	3.5	5.1
Service	5.1	7.5	Service	0.9	4.4
Social Sciences	4.9	6.4	Sales	4.0	2.9
Other	35.2	23.1	Other	17.5	1.8
Number	1,820	341	Number	1,180	246

TABLE C3. A Rank-Ordering of Major Industries of Employment for Bachelor's Degree Graduates
Two Years after Graduation, by Field of Study, 1971 and 1978

	Year	Employed graduates	Industry								
	Number		----Per cent----								
All graduates			Education (801-809)	Public admin. (Div 11)	Manage. services (851-869)	Health/ Welfare (821-828)	Manuf. (Div 5)	Finan./ Insur. (Div 9)	Trade (Div 8)	Transp./ commun. (Div 7)	Other ind.
Canada	1971	38,252	50.4	7.1	7.8	6.9	7.2	3.3	3.5	3.5	10.3
Nine provinces	1978	49,580	41.2	11.7	9.2	8.2	7.5	5.1	4.7	4.1	8.3
Business, Management and Commerce			Manage. services (851-869)	Finance (701-715)	Manuf. (Div 5)	Public admin. (Div 11)	Trade (Div 8)	Education (801-809)	Other ind.		
Canada	1971	2,100	30.6	5.7	16.8	12.0	6.5	5.0	23.4		
Nine provinces	1978	3,604	30.4	10.6	13.0	11.7	8.3	8.0	18.0		
Education			Education (801-809)	Other service industry (Div 10)	Public admin. (Div 11)	Manuf. (Div 5)	Finan. insur. (Div 9)	Transp. communic. utilities (Div 7)	Other ind.		
Canada	1971	7,976	92.3	1.4	1.9	0.9	0.2	0.4	2.9		
Nine provinces	1978	10,274	82.5	5.1	5.0	2.5	1.5	1.2	2.2		
Humanities			Education (801-809)	Other service industry (Div 10)	Public admin. (Div 11)	Manuf. (Div 5)	Trade (Div 8)	Finan./ Insur. (Div 9)	Other ind.		
Canada	1971	7,132	60.5	13.1	8.2	4.9	3.7	1.8	7.8		
Nine provinces	1978	7,784	52.1	12.4	10.2	7.9	5.4	4.7	7.3		
Social sciences			Education (801-809)	Public admin. (Div 11)	Manage. services (851-859)	Health/ Welfare (821-828)	Finan./ Insur. (Div 9)	Manuf. (Div 5)	Other ind.		
Canada	1971	7,746	37.4	8.1	16.2	8.7	6.7	4.7	18.2		
Nine provinces	1978	12,884	33.6	16.0	13.5	8.4	6.3	6.1	16.1		

TABLE C3. (Cont'd.). A Rank-Ordering of Major Industries of Employment of Bachelor's Graduates
Two Years after Graduation, by Field of Study, 1971 and 1978

	Year	Employed graduates	Industry						
		Number	-----Per cent -----						
Agriculture/ Biological sciences			Education	Public	Health/	Manuf.	Trade	Finan./	Other
			(801-809)	admin. (Div 11)	Welfare (821-828)	(Div 5)	(Div 8)	Insur. (Div 9)	ind.
Canada	1971	2,684	45.9	10.3	9.6	9.4	4.5	0.2	20.1
Nine provinces	1978	2,046	26.0	18.4	10.9	10.2	7.3	3.8	23.4
Engineering/ Applied Sciences			Manuf.	Commun./	Manag.	Public	Const.	Trade	Other
			(Div 5)	utilities (Div 7)	services (851-869)	admin. (Div 11)	(Div 6)	(Div 8)	ind.
Canada	1971	2,608	28.0	17.2	13.1	10.3	3.4	3.1	24.9
Nine provinces	1978	2,684	23.4	16.9	21.0	12.8	4.9	2.4	17.6
Health disciplines			Health/ Welfare	Retail trade	Public admin.	Education	Manuf.	Transp./ Commun./ utilities	Other ind.
			(821-828)	(631-699)	(Div 11)	(801-809)	(Div 5)	(Div 7)	
Canada	1971	2,147	62.9	12.4	4.3	14.0	0.3	-	6.1
Nine provinces	1978	2,778	70.0	12.2	10.4	4.3	1.2	0.3	1.6
Mathematics/ Physical sciences			Education	Manage. services	Manuf.	Public admin.	Finan. Insur.	Transp./ Commun./ utilities	Other ind.
			(801-809)	(851-869)	(Div 5)	(Div 11)	(Div 9)	(Div 7)	
Canada	1971	2,980	42.1	9.3	13.1	8.5	7.4	4.8	14.8
Nine provinces	1978	2,897	26.9	15.3	13.3	12.3	12.2	7.9	12.1
No specialization			Education	Public admin.	Health/ Welfare	Trade	Finan./ Insur.	Manage. services	Other ind.
			(801-809)	(Div 11)	(821-828)	(Div.8)	(Div 9)	(851-869)	
Canada	1971	3,000	52.7	8.7	3.0	2.2	4.4	5.2	23.8
Nine provinces	1978	586	39.3	16.9	8.9	7.2	5.6	4.9	17.2

Note: Numbers in () refer to the SIC code for the industry.

TABLE C4. A Rank-Ordering of Major Industries of Employment for Bachelor's Graduates
Two Years after Graduation, by Field of Study and by Sex, 1971 and 1978

Male			Female		
Industry	1971 (Canada)	1978 (Nine prov.)	Industry	1971 (Canada)	1978 (Nine prov.)
----Per cent----			----Per cent----		
ALL GRADUATES					
Education	41.5	29.4	Education	67.3	54.4
Manag. Services	10.7	13.8	Health/Welfare	10.8	10.7
Public Admin.	8.8	13.2	Public Admin.	3.9	10.0
Manufacturing	10.1	11.0	Other Services	4.2	8.4
Health/Welfare	4.9	5.9	Finance/Insurance	2.1	4.7
Trans./Commun.	4.1	5.6	Trade	2.7	4.2
Other Industry	19.9	21.1	Other Industry	9.0	7.6
Number	25,040	26,090	Number	13,220	23,330
Business Management					
Manag. Services	30.3	31.8	Manag. Services	38.5	24.0
Manufacturing	16.7	14.0	Education	30.6	18.7
Finance/Insurance	10.3	13.3	Finance/Insurance	0.0	18.1
Trade	6.7	8.4	Public Admin.	0.0	13.5
Transp./Commun.	6.0	5.5	Manufacturing	17.6	9.2
Education	3.9	5.4	Trade	0.0	8.2
Other Industry	26.1	21.6	Other Industry	13.3	8.3
Number	2,019	2,883	Number	82	707
Education					
Education	91.3	77.8	Education	93.5	85.5
Public Admin.	1.6	6.9	Public Admin.	2.2	3.8
Manufacturing	1.5	3.3	Health/Welfare	0.6	3.5
Other Services	1.8	2.5	Manufacturing	0.1	1.9
Amusement/Recreation	0.0	1.6	Finance/Insurance	0.1	1.7
Management Services	0.0	1.5	Other Service	0.4	1.2
Other Industry	3.8	6.4	Other Industry	3.1	2.4
Number	4,335	4,035	Number	3,642	6,211
Humanities					
Education	51.4	40.4	Education	71.3	60.6
Other Serv.	15.7	15.5	Other Serv.	9.9	10.3
Public Admin.	10.7	12.0	Public Admin.	5.1	9.1
Manufacturing	6.4	11.0	Management Serv.	3.3	5.2
Trade	3.6	6.2	Finance/Insurance	0.6	5.1
Finance/Insurance	2.8	4.3	Trade	3.7	4.8
Other Industry	9.4	10.6	Other Industry	6.1	4.9
Number	3,889	3,178	Number	3,244	4,558
Social Science					
Education	33.6	23.6	Education	46.1	44.8
Management Serv.	21.1	20.0	Pubic Admin.	3.7	14.7
Public Admin.	10.0	17.2	Health/Welfare	20.3	12.4
Manufacturing	5.4	9.3	Management Services	5.3	6.3
Finance/Insurance	7.2	6.9	Finance/Insurance	5.6	5.8
Trade	3.4	5.6	Trade	1.8	3.8
Other Industry	19.3	17.4	Other Industry	17.2	12.2
Number	5,368	6,765	Number	2,378	6,096

TABLE C4. (Cont'd.). A Rank-Ordering of Major Industries of Employment for Bachelor's Graduates Two Years after Graduation, by Field of Study and Sex, 1971 and 1978

Male			Female		
Industry	1971 (Canada)	1978 (Nine prov.)	Industry	1971 (Canada)	1978 (Nine prov.)
----Per cent----			----Per cent----		
Agric./Biological Sciences					
Public Admin.	12.5	20.8	Education	59.9	33.3
Education	36.0	20.0	Health/Welfare	14.3	18.2
Manufacturing	15.8	13.3	Public Admin.	7.4	15.4
Agriculture	5.1	10.9	Other Services	0.0	7.8
Trade	6.0	8.7	Manufacturing	0.3	6.6
Health/Welfare	6.2	4.9	Trade	2.3	5.6
Other Industry	18.4	21.4	Other Industry	15.8	13.1
Number	1,195	2,038	Number	851	1,704
Engineering and Applied Sciences					
Manufacturing	28.0	23.8	Management Serv.	52.2	21.9
Management Serv.	12.8	20.9	Finance/Insurance	0.0	20.2
Transp./Commun.	17.3	16.9	Manufacturing	31.8	15.6
Public Admin.	10.4	12.9	Trans. Commun.	0.0	13.7
Mines & Oils	6.5	7.4	Public Admin.	0.0	11.8
Other Services	7.8	6.9	Trade	0.0	10.1
Other Industry	17.2	11.2	Other Industry	16.0	6.7
Number	2,590	2,555	Number	-	122
Health					
Health/Welfare	70.5	78.8	Health/Welfare	55.5	64.6
Trade	15.8	11.7	Public Admin.	1.1	15.1
Manufacturing	0.6	2.8	Trade	9.0	13.3
Education	4.3	2.7	Education	23.7	5.3
Public Admin.	7.6	2.7	Other Services	0.0	0.9
Trans./Commun.	0.0	0.4	Manufacturing	0.0	0.4
Other Industry	1.2	0.9	Other Industry	10.7	0.4
Number	1,065	1,060	Number	1,080	1,760
Math & Physical Science					
Education	41.8	24.9	Education	44.0	33.6
Management Serv.	10.2	16.1	Finance/Insurance	13.5	16.2
Manufacturing	15.1	15.0	Management Serv.	4.3	12.8
Public Admin.	8.7	12.8	Public Admin.	7.2	10.8
Finance/Insurance	6.3	11.0	Manufacturing	2.1	7.7
Trans./Commun.	4.4	8.3	Trans./Commun.	7.6	6.2
Other Industry	13.5	11.9	Other Industry	21.3	12.7
Number	2,527	2,243	Number	452	651
No Specialization					
Public Admin.	10.2	22.0	Education	71.4	68.4
Education	40.5	18.8	Public Admin.	6.3	9.8
Finance/Insurance	4.3	9.6	Health/Welfare	2.8	8.1
Health/Welfare	3.1	9.4	Trade	0.0	7.8
Management Serv.	7.9	7.9	Food Accom.	0.0	4.4
Trans./Commun.	2.0	7.7	Other Services	5.1	1.5
Other Industry	32.0	24.6	Other Industry	14.4	0.0
Number	1,820	341	Number	1,190	246

Appendix D

LIST OF CODES USED IN THE REPORT

Included in this appendix are:

- o a list of Highly Qualified Manpower Occupations
- o a list of industries included in the public non-commercial sector
- o a description of occupation codes (CCDO)
- o field of study classifications.

1. Highly Qualified Manpower Occupations

Highly qualified manpower (HQM) occupations are those requiring two or more years of postsecondary education. The classification of HQM occupations was done by analysts in the University Branch of the Ministry of State for Science and Technology (MOSST) while developing a highly qualified manpower demand model.

The decision to classify an occupation as HQM or non-HQM was based on two indexes associated with each occupation listed in the Canadian Classification and Dictionary of Occupations (CCDO) system. These indexes--the General Educational Development (GED) and Specific Vocational Preparation (SVP)--indicate the level of general education and specific vocational training required in each occupation. In the MOSST model, each CCDO occupation at the 4-digit level was assigned to the HQM or non-HQM category. Details of the algorithm used to assign each occupation can be found in the report The MOSST HQM Demand Model Methodology, (Ottawa: Supply and Services Canada, 1980). It is available from the Universities Branch, Ministry of State For Science and Technology, Ottawa.

The occupations designated HQM are shown on the next page.

HQM Occupations

The following list shows the 4-digit CCDO (or OCM) occupations included in the HQM category, and the MOSST aggregation of them into major groups.

<u>Major Group</u>	<u>CCDO Number</u>	<u>Occupation</u>
Health	3113	Dentistry
	3111	Medicine
	3151	Pharmacy
	3130-31	Nursing
	3137	Rehabilitation Therapy
	1134	Health Administration
	3117-19-53	Other HQM Health
Engineering	2141	Architecture
	2141	Chemical Engineering
	2143	Civil Engineering
	2144	Electrical Engineering
	2147	Mechanical Engineering
	2151	Metallurgical Engineering
	2155	Aeronautical Engineering
	2153	Mining Engineering
	2154	Petroleum Engineering
	2145	Industrial Engineering
	2157-59	Engineering n.e.s.
Life Sciences	3115	Veterinary Medicine
	3152	Dietetics and Nutrition
	2131	Agriculture and Related
	2133	Biology and Related
Physical Sciences and Mathematics	2112	Geology
	2114	Meteorology
	2111	Chemistry
	2113	Physics
	2181-89	Mathematics
	2183	Computer Science
Humanities and Fine Arts	2511-13-19	Religion
	2350-51	Library and Archival
	3355	Translation
	3311-13-14-	Other HQM Humanities
	30-32-33-52-	
	53	

<u>Major Group</u>	<u>CCDO Number</u>	<u>Occupation</u>
Education	2711	University Teaching
	2731	Elementary and Preschool
	2733	Secondary School
	2791	Community College Teaching
	2719-39-92- 93-95 and	Other HQM Education
	2391 and 1133	
Law	2341-43	Judges, Lawyers, Notaries
Commerce, Administration and Government	1111-13-15-16	Government Officials and
	19	Administrators
	6116	Commissioned Officers (Military)
	1130-31-32- 35-36-37-41- 42-43-45-47- 49	General Administration
	1174-75-76-79	Related Management
	1171	Accounting
	5131	Technical Sales
	5170	Supervising - Sales and Services
	5173	Sales, Securities
	7131	Farm Management
Social Sciences	2331-99	Social Work
	2315	Psychology
	2311	Economics
	2313	Sociology, Anthropology and Related
	2319	Other Social Sciences and Related n.e.s.

2. The Public Non-Commercial Sector

Industries which are supported largely by public funds, provide a public service, and are essentially non-commercial in nature (that is, not profit-oriented) are said to be public non-commercial industries. All other industrial are considered to be commercial (that is, profit-oriented), whether they are public or private industries. The public non-commercial industries and their Standard Industrial Classification (SIC) code are listed below. All others were in the commercial sector of the economy. See the Standard Industrial Classifications Manual (1971) for further detail.

<u>Industry</u>	<u>SIC</u>
Education and Related Services	800 to 809
Hospitals	821
Related Health Care Institutions	822
Miscellaneous Health Services	827
Welfare Organizations	828
Religious Organizations	831
Defence Services	902
Other Federal Administration	909
Provincial Administration	931
Local Administration	951
Other Government Offices	991
Post Office	548
Experimental and University Farms	001
Urban Transit Systems	509

3. Occupational Categories Used in the Analysis

The following list of occupational categories is not complete; it is given for demonstrative purposes only. For a detailed description of the occupational categories, see Guide, Canadian Classification and Dictionary of Occupations, Employment and Immigration Canada.

<u>2-digit level</u>	<u>3-digit level</u>	<u>Typical occupations included</u>
Managerial, Administrative and Related Occupations (11)	Government Administration (111)	government administrators, postal management, inspectors, etc.
	Non-government Administration (113/114)	general managers, managers in professional occupations, production and service managers, etc.
	Management Support (117)	accountants, auditors, personnel officers, purchasers, non-government inspectors, etc.
Natural Sciences, Engineering, and Mathematics (21)	Physical Sciences (211)	chemists, geologists, physicists, meteorologists, technicians and technologists in the physical sciences
	Life Sciences (213)	agriculturalists, biologists, technicians and technologists in this area
	Architecture Engineering (214/215)	architects, engineers
	Engineering Support	draftsmen, engineering technologists and technicians, engineering supervisors
	Mathematics and Systems Analysis (218)	mathematicians, statisticians, systems analysts, computer programmers, and related occupations

<u>2-digit level</u>	<u>3-digit level</u>	<u>Typical occupations included</u>
Social Sciences (23)	Social Science Occupations (231)	economists, sociologists, psychologists
	Social Work (233)	social workers, community service workers
	Law (234)	lawyers, judges, notaries
	Library	libraries, museum archivists
	Other Social	educational and vocational counselors
Religion (25)	Religion (251)	ministers, nuns, priests
Teaching (27)	University Teaching (271)	self-explanatory
	Elementary- Secondary Teaching (273)	self-explanatory
	Community College and other training (279)	teachers in community colleges, vocational and fine arts instructors, other teachers
Medicine and Health (31)	Medicine, Dentistry, Veterinary, Medicine (311)	self-explanatory
	Nursing, Therapy (313)	self-explanatory
	Other Health (315)	pharmacists, dietitians, optometrists radiological technicians, lab technolo- gists, denturists, dental assistants
Artistic, Literary (33)	Commercial Art, Photo- graphy (331)	painters, sculptors, advertising artists
	Performing and Audio- (333)	musicians, directors, dancers, radio and TV announcers
	Writing (335)	writers, editors, translators, inter- preters

<u>2-digit level</u>	<u>3-digit level</u>	<u>Typical occupations included</u>
Sports and Recreation (37)	Sports and Recreation (37)	coaches, managers, athletes, attendants
Clerical and Related (41)	Stenographers and Typists (411)	self-explanatory
	Bookkeeping (413)	bookkeepers, accounting clerks, tellers, insurance and financial clerks, statistical clerks
	Other (414 to 419)	all other clerical occupations
Sales Occupations (51)	No 3-digit breakdown used in this study	commercial travellers, sales workers and clerks, service station attendants, real estate occupations, traders in securities, advertising sales occupations, buyers in wholesale and retail trade
Service Occupations (61)	No 3-digit breakdown used in this study	protective service (police, guards, etc.), food and beverage preparation, lodging and accommodation, personal service (hair-dressers, travel agents, etc.), laundering
Primary industry occupations (71,73,75,77)	No 3-digit breakdown used in this study	farming, fishing, trapping, forestry and logging, mining, oil and gas occupations
Processing and Assembling Occupations (81,82,83,85,87)	No 3-digit breakdown used in this study	non-HQM occupations in metal, mineral, chemical, food, wood, textile, etc., processing, machining and metal working, product assembly, and non-HQM occupations in construction
Equipment operators and other occupations (91 to 95)	No 3-digit breakdown used in this study	airline pilots, operators in railways and motor transport, material handling, printer, stationary engineers, electronic equipment operators

4. Field of Study Codes

Following is a list of the detailed fields of study included in the aggregate fields used in the report.

<u>Aggregate Field</u>	<u>Detailed Fields</u>
Education	physical education, other teacher training
Fine Arts	drama, theatre, music, other fine or applied arts
Humanities	classics, classical languages, modern languages (eg. English, French, Spanish, German) history, library and records science, mass media studies, philosophy, religious studies, other humanities
Social Sciences	anthropology, archeology, economics, geography, law, man/environment studies, political science, psychology, social work, sociology, other social sciences
Agriculture and Biological Sciences	agriculture, biochemistry, biology, botany, household, sciences, veterinary sciences, zoology, other biological sciences
Engineering and Applied Sciences	chemical engineering, civil engineering, electrical engineering, mechanical engineering, other engineering, architecture, forestry, other applied sciences,
Health	dentistry, medicine, nursing, pharmacy, public health, rehabilitation medicine, other health specializations
Mathematics and Physical	chemistry, geology, mathematics and/or computer science, physics, other physical sciences
Business, Commerce	business, commerce, business administration, management
No Specialization	self-explanatory

Appendix E

INDEX OF CONCENTRATION

The index of concentration used in this report to indicate the degree of concentration of university graduates in occupations and industries is basically a measure of the extent to which any discrete distribution varies from a uniform discrete distribution. If the distribution in question is a perfectly uniform distribution (that is, the proportion in each category is exactly the same and graduates are dispersed equally among all occupations or industries), the value of the indicator is zero. If the distribution in question has one category at 100 percent and the rest zero -- that is, all cases concentrated in a single category -- then the value of the index is 1.0.

The value is constructed as follows:

Let i denote any one of r discrete categories being used. Let X_i denote the number of cases in category i , and N the total number of cases. To calculate the index, the categories are rank-ordered according to X_i .

The proportion in any category i is then $P_i = X_i/N$, and the cumulative distribution for category i is then $\sum_{j=1}^i P_j$. If the distribution were perfectly uniform, the cumulative distribution at each category i would be i/r . Hence, the extent to which any category i deviates from a uniform distribution is indicated by:

$$\left(\sum_{j=1}^i P_j \right) - i/r$$

The measure of the deviation summed over all r categories is then

$$\sum_{i=1}^r \left[\left(\sum_{j=1}^i P_j \right) - i/r \right]$$

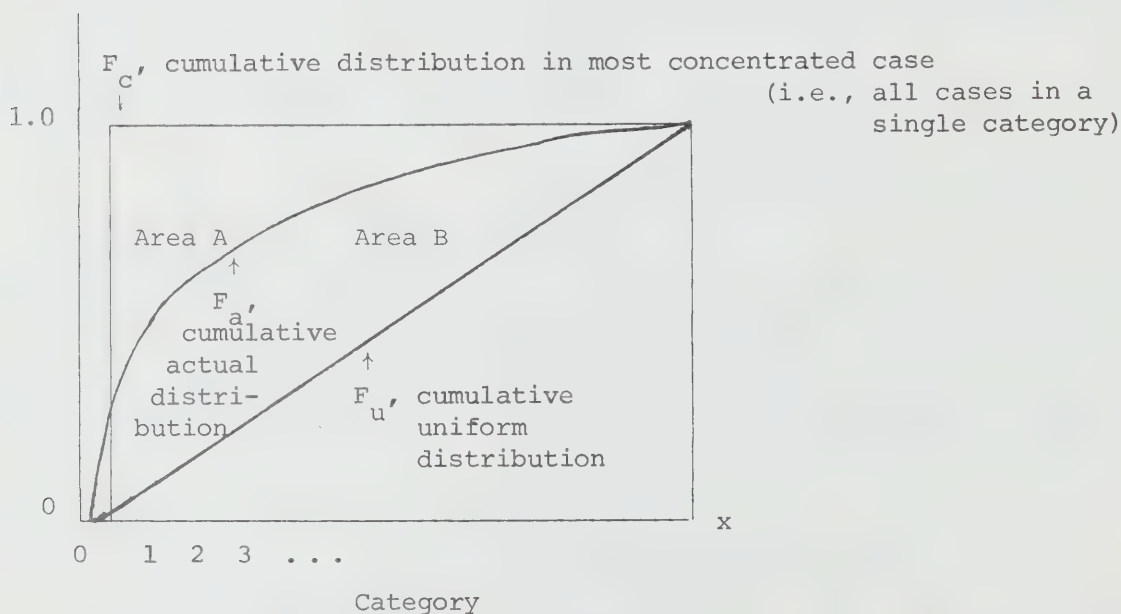
To normalize this measure to a value of 1.0 if $P_i = 1.0$ for $i=1$, the above expression is divided by $.5(r-1)$. The index then becomes

$$I_{\text{concentration}} = \frac{1}{.5(r-1)} \sum_{i=1}^i \left[\left(\sum_{j=1}^i P_j \right) - i/r \right]$$

where the r categories are rank-ordered in descending order according to P_i (or X_i).

The index can be easily displayed on a graph. In the diagram below, it is simply area B (a measure of the deviation from a uniform distribution) divided by the sum of areas A+B (a measure of the maximum possible deviation from the uniform distribution).

Cumulative Distributions



or $I_{\text{concentration}} = \text{Area B} / (\text{Area A} + \text{Area B})$

$$I_{\text{con}} = \left[\int_0^r F_a dx - \int_0^r F_u dx \right] / \left[\int_0^r F_c dx - \int_0^r F_u dx \right]$$

Appendix F

ADDITIONAL TABLES ON DEGREES GRANTED

Table F1. Number of Bachelor's and First Professional Degrees Granted in Canada by Field of Study, 1970 to 1981

Qualifications	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Public-Sector Oriented Fields												
No Specialization	9,289	10,083	11,376	9,184	8,948	8,623	8,158	7,962	7,960	7,588	7,429	7,694
Education	12,306	15,406	16,339	16,396	15,320	18,420	19,604	19,775	19,514	18,250	16,901	16,389
Fine Arts & Hum.	10,383	9,960	10,563	10,629	11,763	12,258	12,239	12,963	12,936	12,111	12,123	11,397
Social Science	8,044	9,273	10,195	10,374	11,748	12,637	12,618	13,553	13,752	13,324	12,886	12,254
Agric./Bio. Sci.	3,255	3,100	3,576	3,502	4,361	5,025	5,840	6,160	6,234	5,594	5,458	5,082
Nursing	1,245	1,258	978	1,224	1,164	1,324	1,362	1,450	1,406	1,440	1,474	1,387
Subtotal	44,522	49,080	53,027	51,309	53,304	58,287	59,821	61,863	61,802	58,307	56,271	54,203
Commercial-Sector Oriented Fields												
Engineering	4,084	4,426	4,704	4,665	4,696	4,809	4,796	5,324	6,029	6,706	7,297	7,134
Math/Phys. Sci.	3,634	3,870	4,146	4,035	4,116	4,057	3,892	4,091	4,244	4,297	4,369	4,270
Economics	1,594	1,751	1,762	1,665	1,735	1,835	1,885	2,169	2,352	2,522	2,444	2,367
Commerce	2,944	3,444	3,733	3,905	4,754	5,328	6,138	6,830	7,637	8,146	8,698	9,426
Subtotal	12,256	13,491	14,345	14,270	15,301	16,029	16,711	18,414	20,262	21,671	22,808	23,197
Professional Fields												
Medical Health (less Nursing)	2,230	2,529	2,918	2,922	3,772	3,768	4,117	4,247	4,263	4,312	4,285	4,434
Law	1,515	1,958	2,126	2,163	2,474	2,670	2,643	2,832	3,022	2,948	3,017	3,084
Subtotal	3,745	4,487	5,044	5,085	6,246	6,438	6,760	7,079	7,285	7,260	7,302	7,518
TOTAL	60,523	67,058	72,416	70,664	74,851	80,754	83,292	87,356	89,349	87,238	86,381	84,918

Table F2. Number of Master's Degrees Granted in Canada by Field of Study, 1970 to 1981

Qualifications	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Public-Sector Oriented Fields												
Education	1,263	1,428	1,741	1,997	1,992	2,161	2,354	2,593	2,825	2,830	2,826	3,139
Fine Arts & Hum.	1,767	2,101	2,412	2,368	2,138	2,256	2,133	2,229	2,263	2,080	1,988	2,089
Social Sciences	1,777	2,092	2,155	2,282	2,314	2,504	2,642	2,761	2,734	2,647	2,714	2,753
Agri./Bio. Sci.	498	565	566	497	444	473	593	638	632	574	617	606
Math/Phys. Sci.	879	946	950	897	801	821	853	917	876	798	767	704
Medical Health	287	257	273	291	262	303	321	363	424	470	504	555
Subtotal	6,481	7,389	8,098	8,345	7,993	8,551	8,925	9,518	9,757	9,401	9,421	9,849
Commercial-Sector Oriented Fields												
Engineering	994	1,183	1,030	1,018	928	963	1,014	1,128	1,150	1,160	1,109	1,031
Commerce/Manage. Business admin.	949	1,037	1,149	1,240	1,275	1,554	1,616	1,729	1,730	1,790	1,902	2,046
Subtotal	1,943	2,220	2,179	2,258	2,203	2,517	2,630	2,857	2,880	2,950	3,011	3,077
TOTAL	8,424	9,609	10,277	10,603	10,196	11,068	11,555	12,375	12,637	12,351	12,432	12,926

Table F3. Number of Doctoral Degrees Granted in Canada by Field of Study, 1970 to 1981

Qualifications	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981*
Education	78	77	109	122	128	172	157	173	157	193	205	199
Fine Arts & Hum.	164	186	213	242	273	295	264	274	278	302	251	298
Social Sciences	158	224	219	269	309	338	385	340	392	379	403	414
Agric./Bio. Sci.	247	286	276	277	240	236	197	228	239	224	210	219
Math/Phys. Sci.	447	521	517	550	471	414	379	369	384	318	334	338
Medical Health	87	93	118	157	153	122	105	105	125	134	137	108
Engineering	191	234	262	299	301	227	188	203	224	231	191	210
Commerce manage. business admin.	--	4	7	10	10	19	12	10	19	18	N/A	N/A
TOTAL	1,372	1,625	1,724	1,929	1,896	1,840	1,693	1,702	1,819	1,803	1,738	1,789

* 1981 figures are preliminary

BIBLIOGRAPHY

- Adams, T.P. "Education, A Shared Responsibility," Canadian Business Review, Vol. 7, No. 4, (Winter, 1980), 19-21.
- Audet, M. Relance à l'université, Groupe Education et Emploi, Ministère de l'éducation, Gouvernement du Québec, Québec, 1979.
- Beach, H.D. Education and Employment of Youth. A background paper for a conference on the same topic. University of Victoria, 1978.
- Becker, G.S. Human Capital. New York: Columbia University Press, 1964.
- Bertrand, G.W. The Contribution of Education to Economic Growth. Staff Study No. 12. Ottawa: Economic Council of Canada, 1966.
- Clark, W. et al. The Class of 2001: The School Age Population, Trends and Implications, 1961-2001. Catalogue No. 81-572. Ottawa: Statistics Canada, 1979.
- Clark, W. and Z. Zsigmond. Job Market Reality for Postsecondary Graduates --Employment Outcome by 1978, Two Years after Graduation. Catalogue No. 81-572. Ottawa: Statistics Canada, 1981.
- Clogg, C. and J.W. Shockey. Trends in the Mismatch Between Occupation and Schooling, 1969-80. Unpublished paper presented at the American Sociological Association Conference, San Francisco, 1982.
- Devereaux, M.S. and E. Rechnitzer. Higher Education--Hired? Ottawa: Statistics Canada, 1980.
- Economic Council of Canada. In Short Supply: Jobs and Skills in the 1980s. Ottawa: Supply and Services Canada, 1982.
- Employment and Immigration Canada. Labour Market Development in the 1980s. Report of the Task Force on Labour Market Development. Ottawa: Supply and Services, 1981.
- Employment and Immigration Canada. Occupational Requirements to 1985. Ottawa: Supply and Services Canada, 1981.
- Employment and Immigration Canada. Supply and Demand for Engineering Manpower in Canada. Ottawa: Supply and Services Canada, 1980.
- Fellegi, I. "Approximate Tests of Independence and Goodness of Fit based on Stratified Multi-stage Samples." Journal of the American Statistical Association, 75, (1980), 261-68.
- Foot, D. Labour Market Analysis with Canadian Macroeconometric Models: A Review. Toronto: Ontario Manpower Commission, 1980.

- Foot, D., N. Meltz, and F. Siddiqui, eds. Manpower Forecasting in Canada: A Discussion of the Issues. Toronto: Centre for Industrial Relations, University of Toronto, 1980.
- Forrester, G.C., J.S. Lees, and R. Hamurer. B.C. Teacher Demand and Supply Projections, 1979-1988. Vancouver: B.C. Research Council, 1979.
- Freeman, R.B. "An Empirical Analysis of Fixed Coefficient Manpower Requirement Models, 1960-70." Journal of Human Resources. Vol. XV, no. 20, (Spring, 1980), 176-99.
- Freeman, R.B. The Work Force of the Future, an Overview. Discussion paper No. 626, Harvard Institute of Economic Research, 1978.
- Freeman, R.B. The Over-Educated American. Toronto: Academic Press, 1976.
- Freeman, R.B. The Changing Economic Value of Higher Education in Developed Countries. A report to the OECD, Discussion paper No. 874, Harvard Institute of Economic Research, January 1982.
- Freeman, R.B. Career Patterns of College Graduates in a Declining Job Market. Discussion paper No. 850, Harvard Institute of Economic Research, 1981.
- Harvey, E. Educational Systems and the Labour Market. Don Mills: Longman, 1974.
- Hidioglou, Rao. "Chi-square Tests for Analysis of Categorical Data from the Canada Health Survey." Unpublished paper, Statistics Canada and Carleton University, Ottawa, 1981.
- Howe, H. "The Value of College as seen by a Non-Economist." College Board Review, No. 100, (Summer, 1976), 6-14.
- McGee, M. and W. Sudmont. The Demand for and Supply of Highly Qualified Manpower in Canada in the 1980s. Burnaby, B.C. The Office of Analytical Studies, Simon Fraser University, 1980.
- McRoberts, H.A. "Age, Education and Employment." A paper presented to the Canadian Sociological and Anthropological Association, Halifax, May, 1981.
- Metz, A.S. and J.L. Crane. New Teachers in the Job Market. Washington: National Centre for Education Statistics, 1980.
- Ministry of State for Science and Technology (MOSST). The MOSST HQM Demand Model Methodology. Ottawa: Supply and Services Canada, 1980.
- Moore, L.F. and L. Charod, eds. Manpower Planning for Canadians, an Anthology. Vancouver, B.C.: Institute for Industrial Relations, University of British Columbia, 1979.

- Picot, G. The Changing Education Profile of Canadians, 1961 to 2000: Projections of the Educational Attainment of the Canadian Population and Labour Force. Ottawa: Statistics Canada, 1980.
- Picot, G. "Post-Secondary Graduates and the Labour Market in Canada, the 1970s and 1980s." A paper presented at the Association for Institutional Research Conference, San Diego, 1979.
- Picot, G. "The Use of Fixed Coefficient Matrices to Relate Occupation and Field of Study in Manpower Requirements to Models." To be published in Labour Market Analysis, Statistics Canada, 1983.
- Rumberger, R.W. "The Economic Decline of College Graduates: Fact or Fancy?" Journal of Human Resources, 15, (1980), 99-112.
- Schwartz, E. and R. Thompson. "Overinvestment in College Training?" Journal of Human Resources, Vol. 15, (1980), 121-23.
- Sharp, L.M. Education and Employment (The Early Careers of College Graduates). Baltimore: John Hopkins Press, 1970.
- Task Force on Employment Opportunities for the 1980s. Work For Tomorrow. House of Commons, Ottawa, 1981.
- U.S. Bureau of Labor Statistics. Occupational Supply: Concepts and Sources of Data for Manpower Analysis. Bulletin 1816. Washington, D.C., 1974.
- Witmer, D.R. "Has the Golden Age of American Higher Education Come to an Abrupt End?" Journal of Human Resources, Vol. 15, 1980, 113-200, 1980.
- Zsigmond, Z. et al. Out of School--Into the Labour Force. Catalogue No. 81-570. Ottawa: Statistics Canada, 1978.

